56 PS

THE
RAILWAY GAZETTE

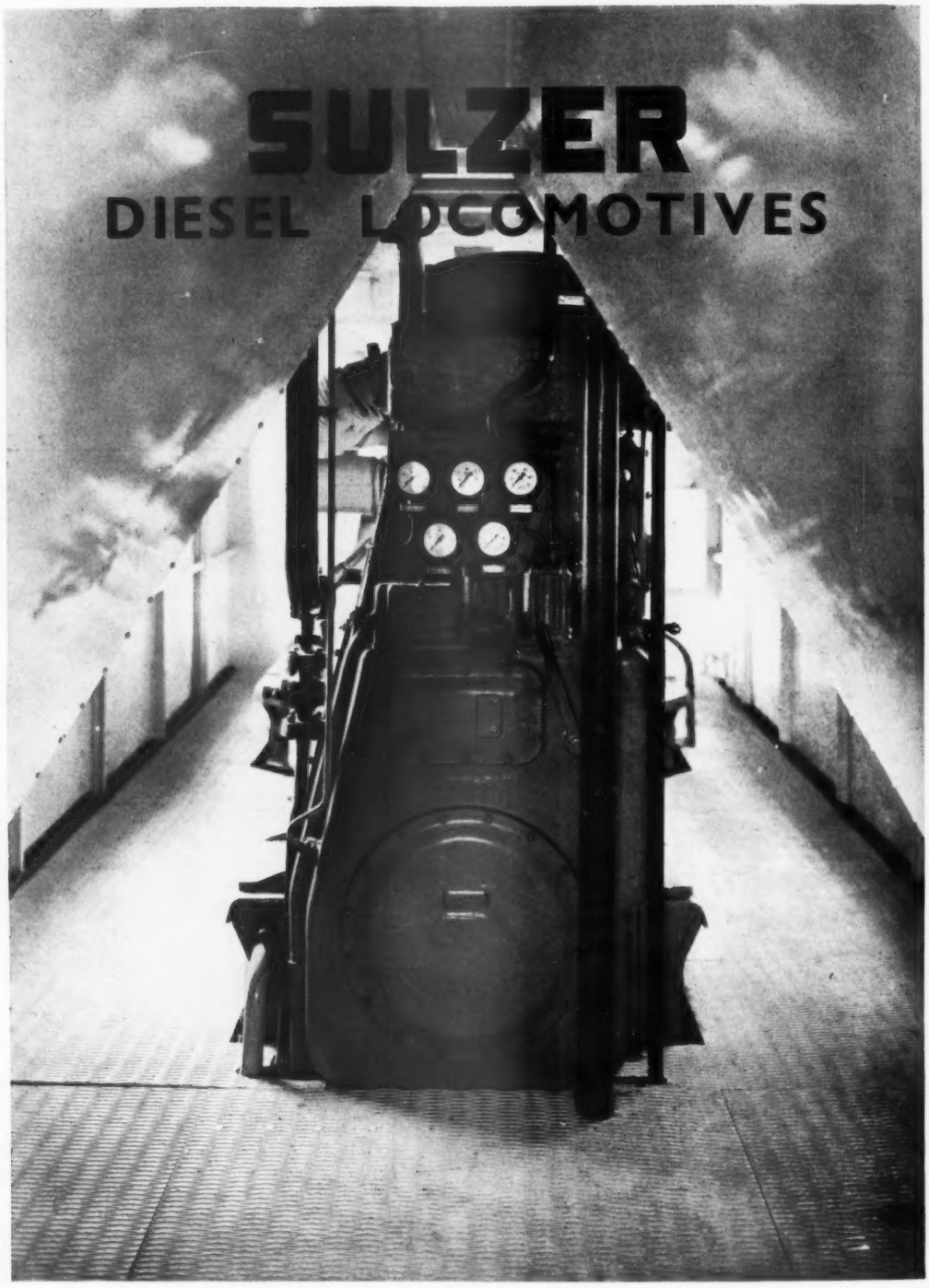
Price: Two Shillings | FRIDAY, FEBRUARY 1, 1952 | Annually £4-10-0 post free

THE ... ORDER
FEB 19 1952
LIBRARY

THE EVER INCREASING DEMAND . .

Beyer-Garratt Locomotives are in service all over the world as an economical form of motive power, the result of continuous development in design and application

Beyer Peacock & Co. Ltd.
LOCOMOTIVE ENGINEERS
MANCHESTER
London Office: Abbey House, Westminster, S.W1
EST. 1854



Interior of SULZER DIESEL LOCOMOTIVE. 610 H.P. at 760 revs/min.

One of 16 supplied to the
Compagnie du Chemin de Fer Dakar Niger, Thies (Senegal).

SULZER BROS (LONDON) LTD., 31, BEDFORD SQUARE, LONDON, W.C.1

SULZER BROTHERS LIMITED HAVE OFFICES AT:— WINTERTHUR – PARIS – NEW YORK – MADRID – CAIRO – RIO DE JANEIRO – BUENOS AIRES – SHANGHAI – KOBE
Agencies at:— BRUSSELS – MILAN – AMSTERDAM – LISBON – COPENHAGEN – OSLO – STOCKHOLM – HELSINKI – ATHENS – ISTANBUL – ALGIERS – JOHANNESBURG – HAIFA – BOMBAY
KARACHI – COLOMBO – SINGAPORE – BANGKOK – MANILA – MONTREAL – MEXICO CITY – BOGOTA – CARACAS – SANTIAGO (CHILE) – LIMA – LA PAZ – SYDNEY – MELBOURNE – WELLINGTON

The Wickman Mobile Demonstration Unit brings skilled help right to the factory floor. Staffed by a team of specialist instructors, the Unit is fully equipped with machine tools for reservicing carbide tools, and many Wimet users have already availed themselves of this opportunity to train operators and executives in the correct methods of applying and servicing these tools. Demonstrations on the design, application and servicing of Wimet tools have been given to over 2,000 operators and, in addition, lectures, supported by sound films and film strips, have been attended by more than 1,000 operators.

The greatest productivity from carbide tooling can only be obtained when operators know the right grade to choose, the right time to withdraw tools from use for reservicing, the right wheels and methods—in fact, the right carbide technique.

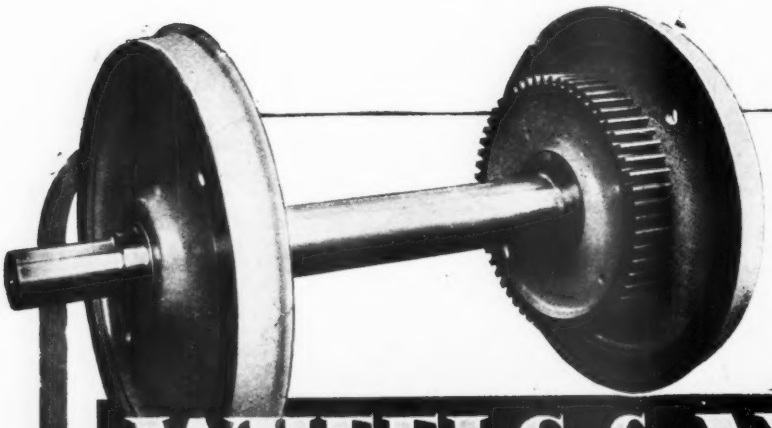
This is just one of the ways Wickman's are helping Wimet users to get the best out of carbide tooling.

WICKMAN *of* COVENTRY

LONDON · BRISTOL · BIRMINGHAM · MANCHESTER
LEEDS · GLASGOW · NEWCASTLE · BELFAST

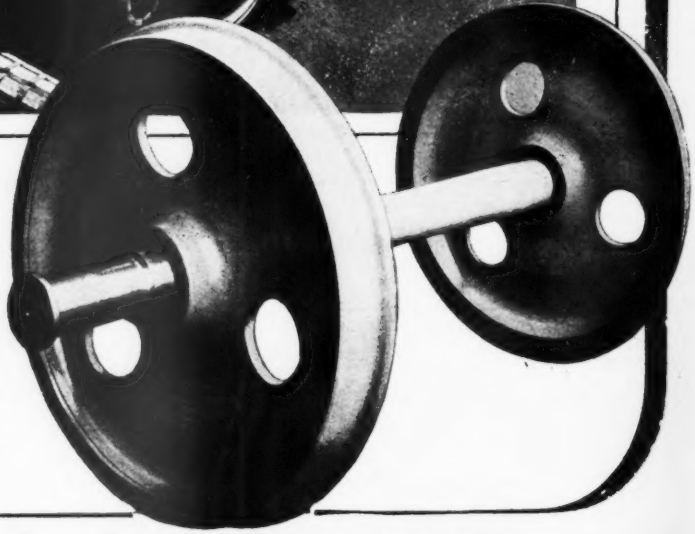
Wimet

215 57



75 YEARS' SPECIALISED EXPERIENCE

WHEELS & AXLES



FOR
RAILWAYS & TRAMWAYS ROLLING STOCK

•

WHEELS—SOLID ROLLED STEEL TYPE — OR BUILT UP WITH ROLLED STEEL TYRES AND DISC OR SPOKE CENTRES

OWEN & DYSON LTD.

ROTHER IRON WORKS, ROTHERHAM • LONDON OFFICE: 8-10, GROSVENOR GARDENS, VICTORIA, S.W.1
ASSOCIATED WITH THE UNITED STEEL COMPANIES, LTD.

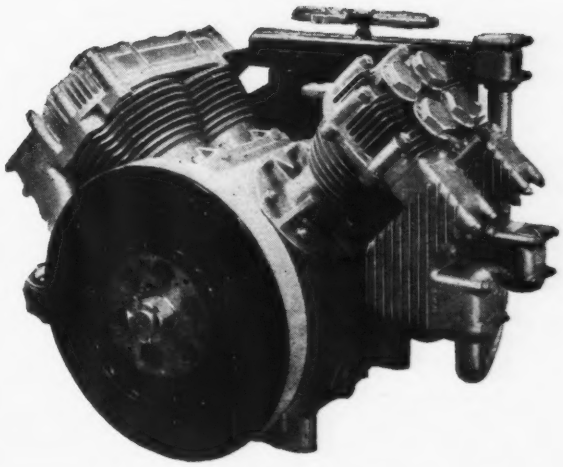
WESTINGHOUSE

air-cooled compound

AIR COMPRESSOR

4-C-320

The first of a new range of high capacity compressors designed for service on heavy diesel or diesel-electric locomotives hauling long trains in hilly country



By courtesy of Mr. F. Harrison, Chief Mechanical Engineer, we show pictures of the new Main Line 1,760 H.P. Diesel Electric Locomotive, "Lady Norrie", designed and built by *South Australian Railways* equipped with the type A-7-EL Westinghouse Brake including Automatic Slack Adjuster and Deadman's Control, and the 4-C-320 Westinghouse Compressor, seen in the lower picture of the power compartment.

Westinghouse Brake & Signal Co. Ltd
82 York Way, King's Cross, London, N.1

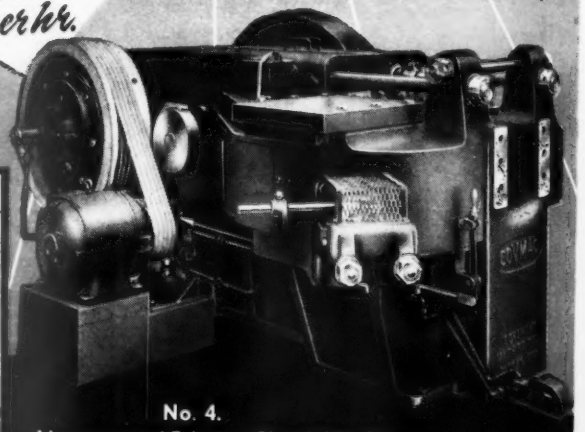
Westinghouse Brake (Australasia) Pty. Ltd
George Street, Concord West, N.S.W

Figures to equal!

Railway Components produced more quickly

thanks to

No of Sketch	Part.	Bar Stock.	No of operations.	No of Machine.	Rate per hour.
1.	Spring.	5" x ½".	6 each end.	6.	14.
2.	Signal lever.	2" x ⅞".	14 squeeze.	5.	200.
3.	Spring hanger.	1½" dia. bar.	4.	4.	80.
4.	Spring hanger.	1½" bar.	24 squeeze.	4.	120.
5.	Hand bar or handle.	1" bar.	2 each end.	4.	80.
6.	Connecting rod.	1⅜" bar.	3.	4.	120.



No. 4.
Air-operated Friction Clutch Machine

COVENTRY MACHINE TOOL WORKS LTD

Telephone 3234 2 lines TURNEY STREET WORKS, OVENDEN RD., HALIFAX 'Grams COVMAC Hx.

About Aluminium... 7

CHEMICAL PROPERTIES

This article is one of a series, written for the interest of students and others, outlining some of the main characteristics of the metal and its structural alloys.

THE durability, or resistance to deterioration by corrosive agencies, of aluminium and many of its alloys is exceptionally high, frequently enabling them to be used without surface protection of any sort, so saving both pre-treatment and maintenance costs. This is often of greater value than its more generally appreciated qualities, such as light weight.

Atmospheric Exposure

Aluminium does, in fact, combine readily with atmospheric oxygen, but the oxide, unlike those of iron or copper, forms as a continuous film, which is hard and very adherent. This stable layer of oxide seals the metal from further oxidation, reforming spontaneously when the surface is cut or abraded in air. Its thickness, as naturally formed, depends on the alloy and on the nature and duration of exposure, but is of the order of a hundred-thousandth of an inch. It is transparent or nearly so, becoming visible as a grey film when thickened by age, exposure, or heating. The metal is exposed to attack only when the surface film is broken and, by lack of oxygen, prevented from reforming.

The nature of the film, and the immunity of the metal, are influenced by the presence of alloying constituents, and some of the strong copper-bearing alloys, for instance, normally need some means of protection. However, the medium-strength alloys that are used for building, and for the majority of civil and mechanical engineering purposes, can generally be used without protection.

Particular attention must be given to alloy selection and conditions of use when the surroundings are industrial and the air may carry many kinds of pollution, some of them aggressive. Except in special cases, however, aluminium will generally outlast other metals and is increasingly used, for instance, on factory roofs in place of galvanized steel.

The aluminium-magnesium group of alloys is particularly resistant to sea and coastal atmospheres, and is used in ship and boat construction.

Exposure of the bare metal to any atmosphere must, after a period (perhaps of years) that will depend on the circumstances, impair its original lustre and smoothness, and, in severe conditions, surface deposits and slight pitting may appear. These changes are almost always superficial, and the appearance can be restored by cleaning.

Aggressive Conditions

Apart from direct attack by corrosive agents, such as alkaline or acidic fumes, or contact with damp cement or plaster, most instances of corrosion in aluminium alloy structures occur in places where air is excluded, often by entrapped moisture. Local corrosion may be the result of an electrochemical process, and when a film of liquid can act as an electrolyte, galvanic action is liable to occur between zones of unequal potential, as provided by dissimilar metals, different alloys of aluminium, or even the aluminium and its own alloying elements or impurities. Copper and nickel are particularly aggressive, iron less so.

Susceptibility of an alloy to corrosion is influenced by other internal factors besides its chemical composition, such as grain size, heat treatment history, and the stress to which the metal is subjected.

Food and Chemicals

The aluminium employed for processing, packing, and cooking foods does not generally need protection, although for packing some products, cans may be lacquered. As the salts of aluminium are colourless, tasteless, and non-poisonous, there are no ill effects when strongly alkaline or acid foods dissolve minute amounts of the metal.

In the chemical industry, aluminium is extensively used, again generally unalloyed and sometimes of especially high purity. It offers considerable resistance to the action of most organic compounds and of such common chemicals as ammonia, sulphuretted hydrogen, and nitric and acetic acids; it is adversely affected by most alkalies, sulphuric and hydrochloric acids, chlorides, carbonates, and fluorides. Interaction is, however, dependent on the concentration and temperature of the reagent, and may be reduced or inhibited altogether by the presence of other substances. The whole subject is very complex and in the space available it is not possible to be more specific.

Protection

In any metallic structure, corners and crevices in which moisture can lodge should be avoided in design or effectively drained or sealed during construction.

Joints between aluminium and other metals can be insulated with a sealing paint (e.g. bitumen) or, preferably, with an inhibiting paint containing zinc chromate or barium chromate. Copper and copper alloy parts should not be used near aluminium structures where there is any possibility of interaction through a moisture layer. Steel bolts, nuts and other fittings are best galvanized or cadmium-plated. Where water-absorbent materials, such as wood and cloth, are in contact with an aluminium surface, it is advisable to interpose a coat of varnish or bituminous paint.

In severe conditions, or when an alloy of inferior corrosion-resistance is to be used, all-over painting may be necessary. Correctly applied, paints last particularly well on aluminium, and should the metal be attacked through damage to the paint, there is no tendency, as there is with rust, for the attack to spread under the paint film. A good base coat is provided by the modern priming paints containing an acid reagent that expends itself in lightly etching the metal. In the best work this is followed by an inhibitive zinc or barium chromate paint, before the finishing coats are applied. Bituminous paint is satisfactory where it is not exposed to sunlight.

Another form of surface protection for strong alloy sheet is applied by the metal fabricator, by 'cladding'. The alloy ingot is sandwiched between plates of high-purity aluminium, which the hot-rolling operations bond permanently to the faces. By whatever amount the gauge of the sheet is thereafter reduced, each skin will represent about 5 % of the total thickness, insulating the strong alloy core from attack and giving electrolytic protection at cut edges and scratches. 'Alclad' sheet was first developed for aircraft construction.

A protective measure widely used in certain fields is the anodizing process, in which the natural oxide film is thickened electrolytically in an acid bath. The film, when freshly developed, is absorbent, and if desired it can be dyed for decoration, or filled with a grease or wax for added protection.

Plating of aluminium with other metals, such as chromium, is practised on a relatively small scale for decoration or to improve the wearing qualities of machine parts. The presence of the oxide film complicates deposition, but reliable methods of overcoming this have been developed.

It may be found that the Noral Data Sheet, which lists mechanical and physical properties of our alloys, is a useful appendix to these articles. We shall be pleased to send you a copy; please mention this journal when writing.

The eighth article will outline thermal characteristics of the metal.

NORTHERN ALUMINIUM COMPANY LIMITED
TECHNICAL DEVELOPMENT DIVISION · BANBURY, OXON

GRESHAM'S CLASS R Locomotive Injectors

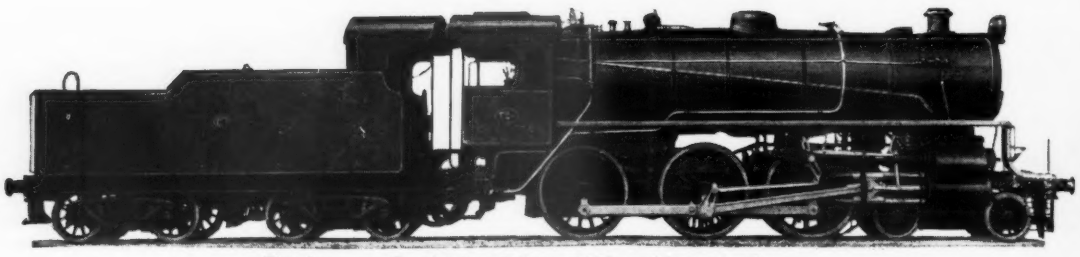
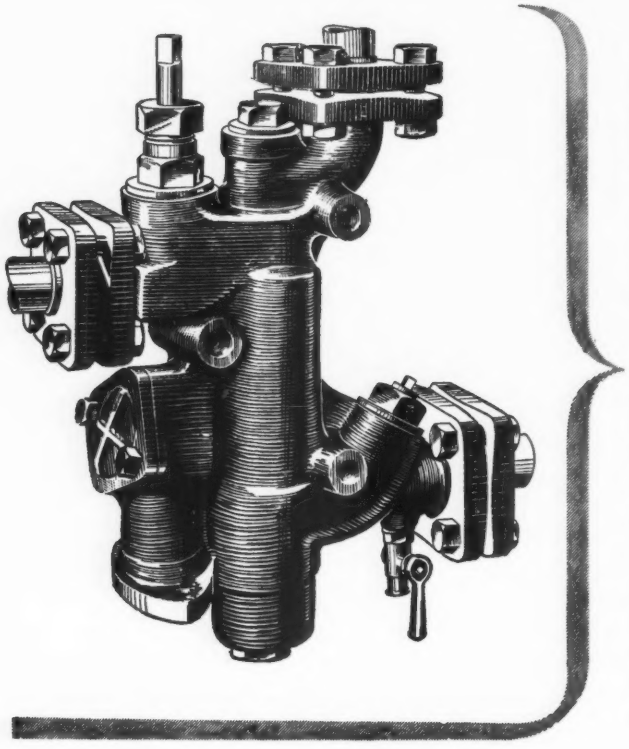


Photo by courtesy Egyptian State Railways and Montreal Locomotive Co.



The New Class "R" Locomotive Injector has been designed to meet the demand for a robust Underfoot-plate Injector to deal adequately with increases in Steam Pressure while embodying those characteristics of modern design so essential for reliable and efficient Locomotive Boiler Feed.

SPECIAL FEATURES

Starting: Overflow passages of ample area provide a direct path to atmosphere thus ensuring easy starting.

Overflow Valves: Two valves are provided, one on the cone carrier, and the other between the Injector body and the overflow pipe. Both are of the hinged flap type and positively exclude air which otherwise would be drawn in and delivered with the feed water to the general detriment of the boiler.

Delivery Valve: This item not only supplements the main clack valve on the boiler, but also prevents loss of water from the feed pipe between the Injector and the boiler each time the Injector is shut down. A small drain cock is provided to release the pressure in the delivery pipe when required.

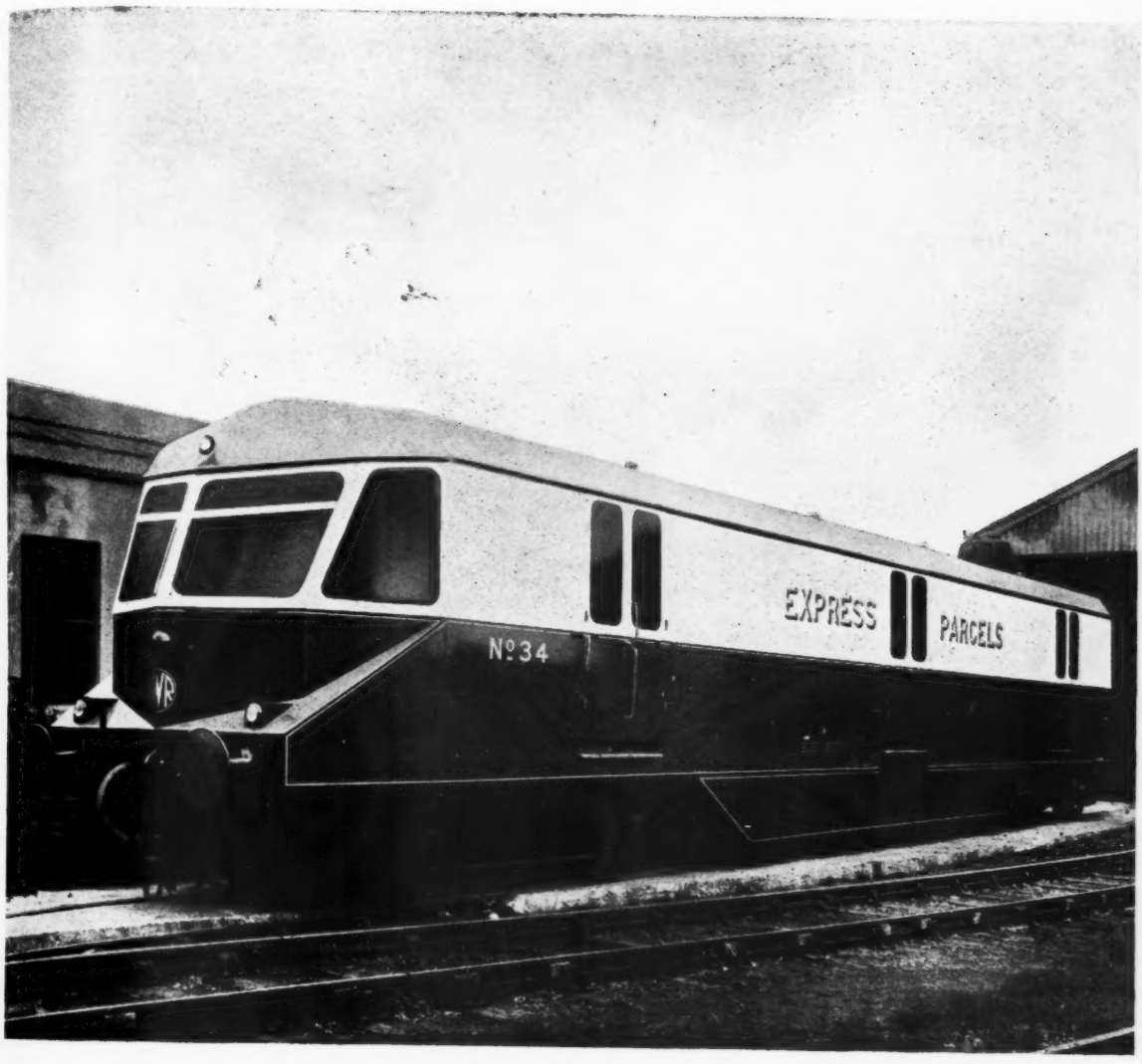
Write for List No 49

GRESHAM & CRAVEN LTD
ORDSALL LANE · SALFORD · MANCHESTER 5
ENGINEERS

Telephone: DEAnsgate 6061-4 Telegrams: Brake Phone, Manchester

London Office: 14, GREAT PETER STREET, WESTMINSTER, LONDON, S.W.1

Wilson



For economical running under all conditions
Railway undertakings can rely upon

A.E.C.
DIESEL RAILCARS

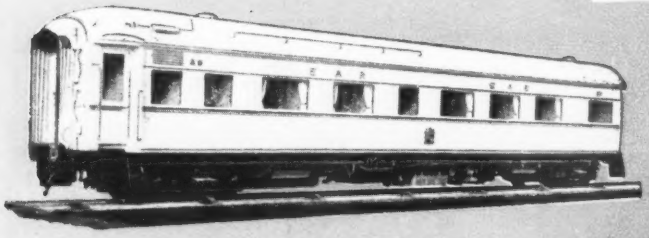
A.E.C. Limited, Southall, Middlesex, is a member of the Group of Companies controlled by Associated Commercial Vehicles Ltd., of which the selling organisation is

A.C.V. SALES LTD., 49 BERKELEY SQUARE, LONDON, W 1. Te ephone: REGENT 2141

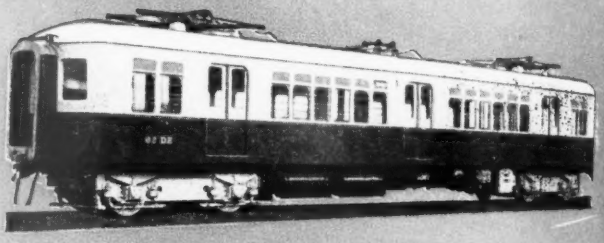
DESIGN AND

METRO-CAMMELL

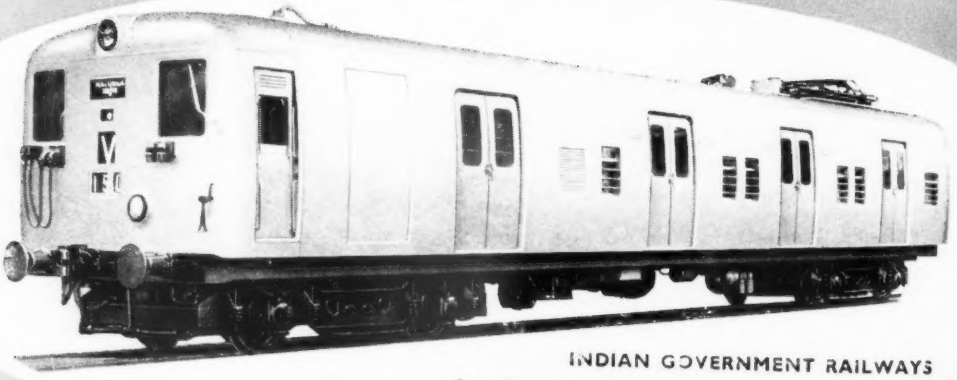
The Name and Associated Qualities which have brought fame to British-built Rolling Stock



SOUTH AFRICAN RAILWAYS
H.M. THE KING'S Air-Conditioned Car for the Royal Train.



CENTRAL RAILWAY OF BRAZIL
2nd Class Steel Motor Coach.



INDIAN GOVERNMENT RAILWAYS
Third Class Steel Motor Coach for
BOMBAY ELECTRIFIED SUBURBAN SERVICES.

✳ METROPOLITAN-CAMMELL

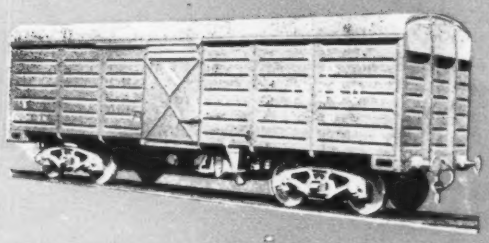
HEAD OFFICE: • SALTLEY • BIRMINGHAM

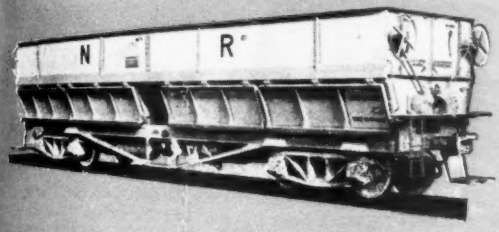
CRAFTSMANSHIP

For over a century, Leading Builders of Rolling Stock for the Railways of the World.

METRO-CAMMELL

ARGENTINE NATIONAL RAILWAY
(General San Martin)
50-Ton Bogie Covered Wagon.



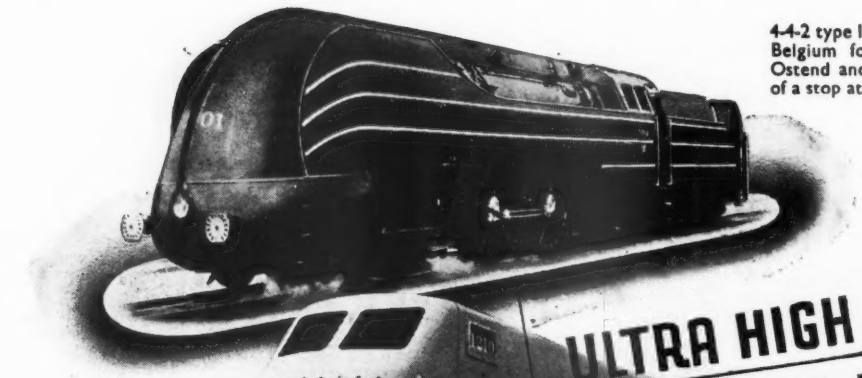


NIGERIAN RAILWAYS
30-Ton Bogie Hopper Coal Wagon.

EAST AFRICAN RAILWAYS & HARBOURS
Bogie Highsided Wagon.

CARRIAGE & WAGON Co. LTD.

LONDON OFFICE: VICKERS HOUSE • BROADWAY • WESTMINSTER S.W.1



4-4-2 type locomotive designed and built in Belgium for the 60-min. service between Ostend and Brussels (70·8 miles), inclusive of a stop at Bruges.

ULTRA HIGH SPEED AND GENERAL UTILITY LOCOMOTIVES

4-8-2 type mixed traffic locomotive for New Zealand built by the North British Locomotive Co. Ltd., Glasgow, for service on lines laid with 50-lb. rails.

- **EXHAUST STEAM INJECTORS.** OVER 30,000 IN SERVICE. The simplest form of Locomotive Feed Water Heating.
- **HOT WATER INJECTORS** work with feed water at any temperature up to 150° F. The only reliable injector for warm climates.
- **STANDARD LIVE STEAM INJECTORS.** ALL STANDARD PATTERNS.
- **VACUUM BRAKE EJECTORS.** The most Powerful and Economical Ejectors made. Interchangeable with all existing Standards.

The engines here illustrated are fitted with the DAVIES & METCALFE

EXHAUST STEAM • INJECTOR •

which is adaptable to ALL conditions of locomotive operation regardless of type, gauge and other circumstances.

DAVIES & METCALFE LTD.

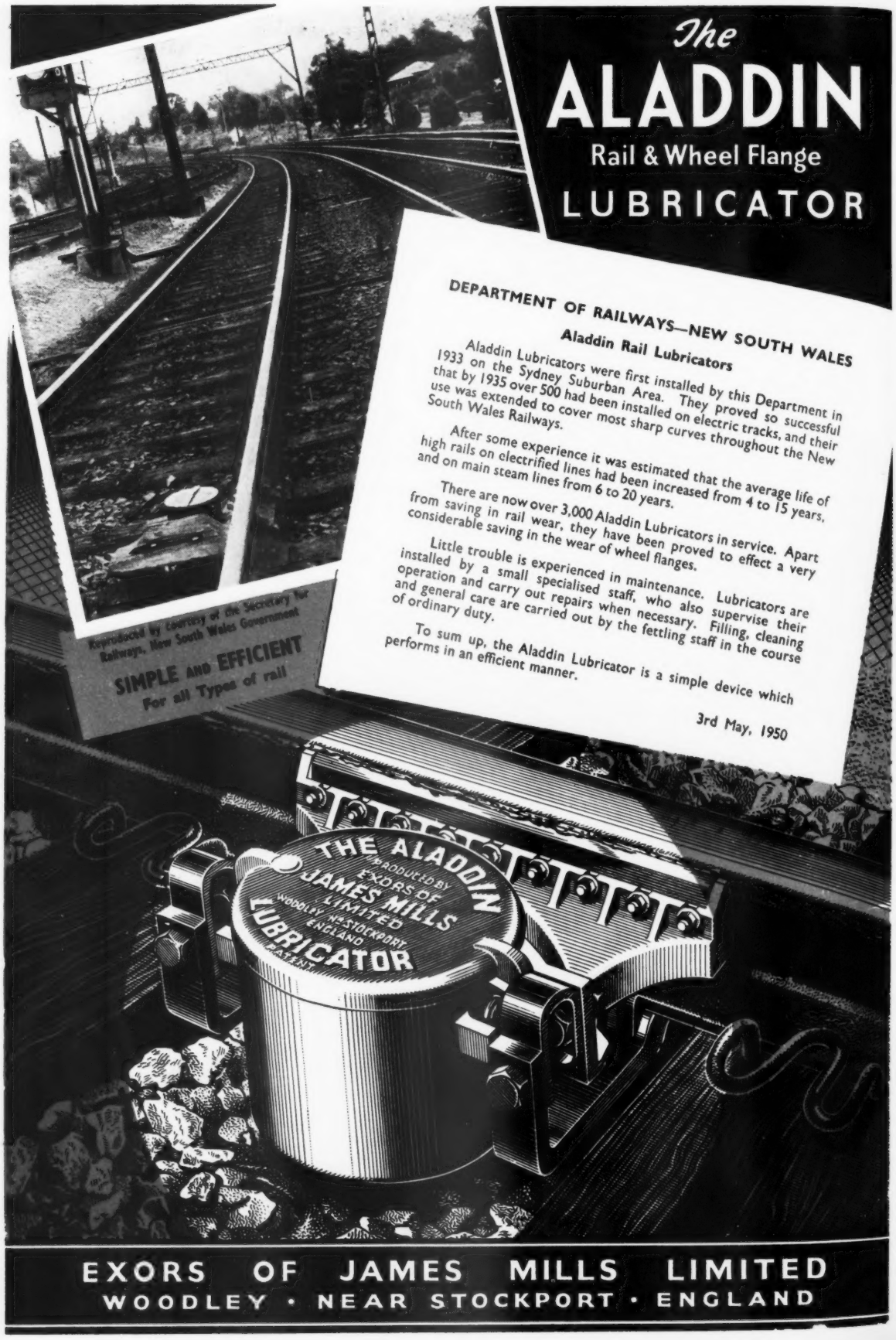
INJECTOR WORKS • ROMILEY, ENGLAND

TELEPHONE: 2626 WOODLEY (2 lines) *TELEGRAMS: "EXHAUST ROMILEY"*

ACROSS THE WORLD
FOR BETTER TRAVEL

Cravens are designing and building all types of railway carriages and rolling stock for world-wide requirements.

CRAVENS RAILWAY CARRIAGE & WAGON CO. LTD. SHEFFIELD 9


The
ALADDIN
Rail & Wheel Flange
LUBRICATOR
DEPARTMENT OF RAILWAYS—NEW SOUTH WALES
Aladdin Rail Lubricators
Aladdin Lubricators were first installed by this Department in 1933 on the Sydney Suburban Area. They proved so successful that by 1935 over 500 had been installed on electric tracks, and their use was extended to cover most sharp curves throughout the New South Wales Railways.
After some experience it was estimated that the average life of high rails on electrified lines had been increased from 4 to 15 years, and on main steam lines from 6 to 20 years.
There are now over 3,000 Aladdin Lubricators in service. Apart from saving in rail wear, they have been proved to effect a very considerable saving in the wear of wheel flanges.
Little trouble is experienced in maintenance. Lubricators are installed by a small specialised staff, who also supervise their operation and carry out repairs when necessary. Filling, cleaning and general care are carried out by the fettling staff in the course of ordinary duty.
To sum up, the Aladdin Lubricator is a simple device which performs in an efficient manner.
3rd May, 1950
Reproduced by courtesy of the Secretary for Railways, New South Wales Government
SIMPLE AND EFFICIENT
For all Types of rail
THE ALADDIN
MANUFACTURED BY
EXORS OF
JAMES MILLS
LIMITED
WOODLEY, NR. STOCKPORT
ENGLAND
LUBRICATOR
PATENT
EXORS OF JAMES MILLS LIMITED
WOODLEY • NEAR STOCKPORT • ENGLAND

'ENGLISH ELECTRIC'

electric traction

One of the latest 1,800 h.p. electric locomotives for New Zealand.

Thirty years of progress in New Zealand

The ENGLISH ELECTRIC Company has supplied electric locomotives and trains to the New Zealand Government Railways continuously since 1921, when the first five 700 h.p. Bo+Bo type, 1,500 volt D.C. electric locomotives were built for the Arthur's Pass—Otira section.

These were followed in 1928 by six 1,220 h.p. Bo+Bo type locomotives for the Christchurch—Lyttelton section, while in 1938 ten 1,240 h.p. 2-Do-1 type locomotives were built for the Wellington—Paekakariki section, the mechanical parts of nine locomotives being erected in New Zealand. Between 1936 and 1950 The ENGLISH ELECTRIC Company also built forty-nine 660 h.p. electric motor coaches and seventy-nine trailer coaches.

Present orders include seven 1,800 h.p. Bo-Bo-Bo type 1,500 volt D.C. electric locomotives which are the first with this wheel arrangement to be built in Great Britain. The mechanical parts for these locomotives are being built by Robert Stephenson & Hawthorns Ltd.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Traction Department, London

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

TNE.3

DORMER

TWIST DRILLS

for increased output—longer life

VARIOUS TYPES FOR DIFFERENT JOBS

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED

SHEFFIELD • ENGLAND PHONE: 24137 (5 LINES) GRAMS: PROELLS • SHEFFIELD

LONDON OFFICE: TERMINAL HOUSE, LOWER BELGRAVE STREET, S.W.1 • Phone: SLOANE 2111 (4 lines) • Grams: PROELLS KNIGHTS LONDON

DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS

SPEED THE SCRAP

SPEED THE STEEL

Bring your detective powers to bear on the search for scrap and you'll probably unearth tons of it disguised as old plant you never use or hidden in out of the way corners of your warehouses, stockrooms and yards.

The new steel every industry needs can be made from the old steel it has done with. Find all you can. Round it up. Turn it in.

YOUR SCRAP MERCHANT

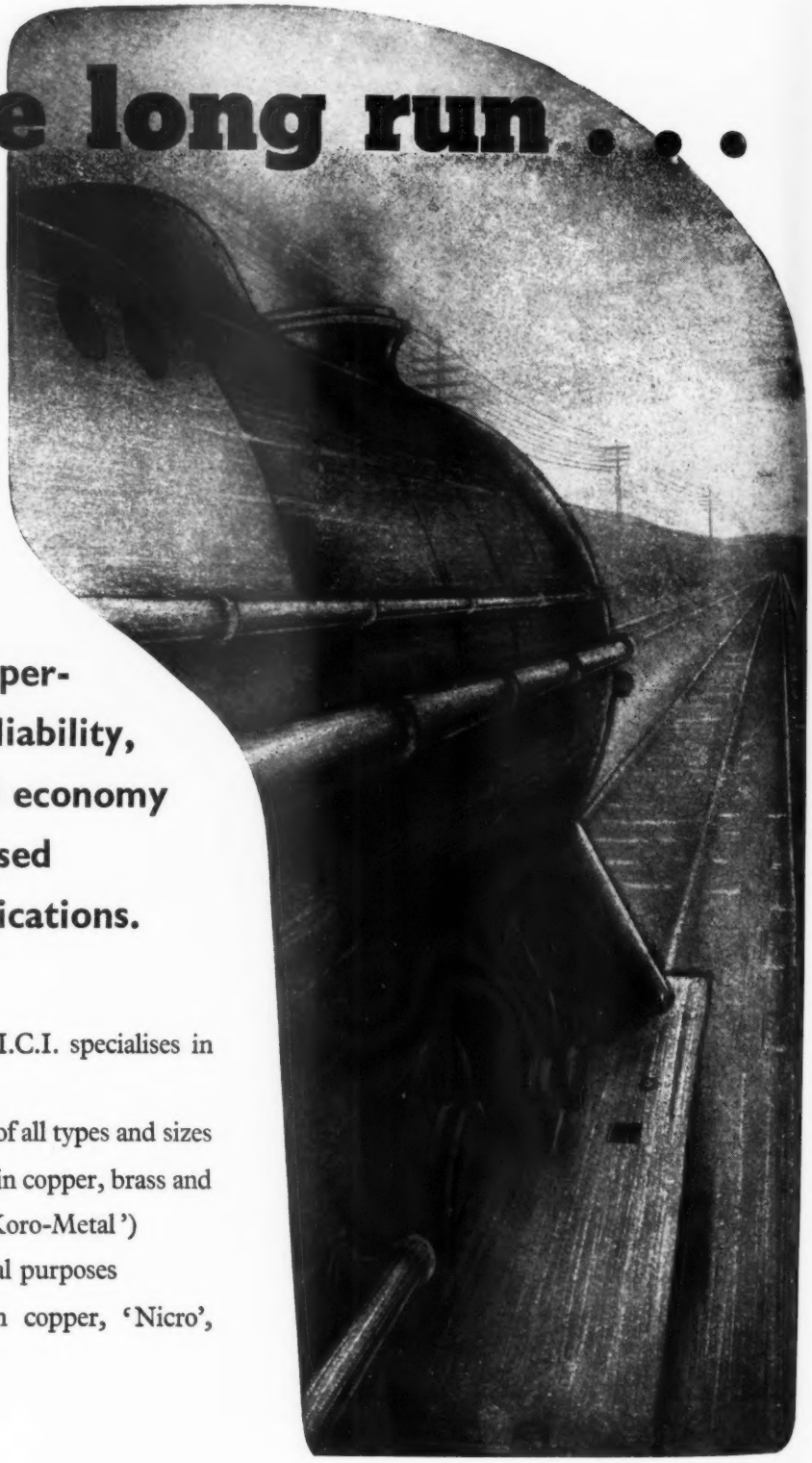
will help with dismantling and collection

Space given to the STEEL SCRAP DRIVE by . . .

THE STEEL COMPANY OF WALES LTD

ABBEY WORKS · PORT TALBOT

In the long run . . .



Copper and copper-alloys ensure reliability, long service and economy in many specialised locomotive applications.

The Metals Division of I.C.I. specialises in the manufacture of:

copper firebox plates of all types and sizes

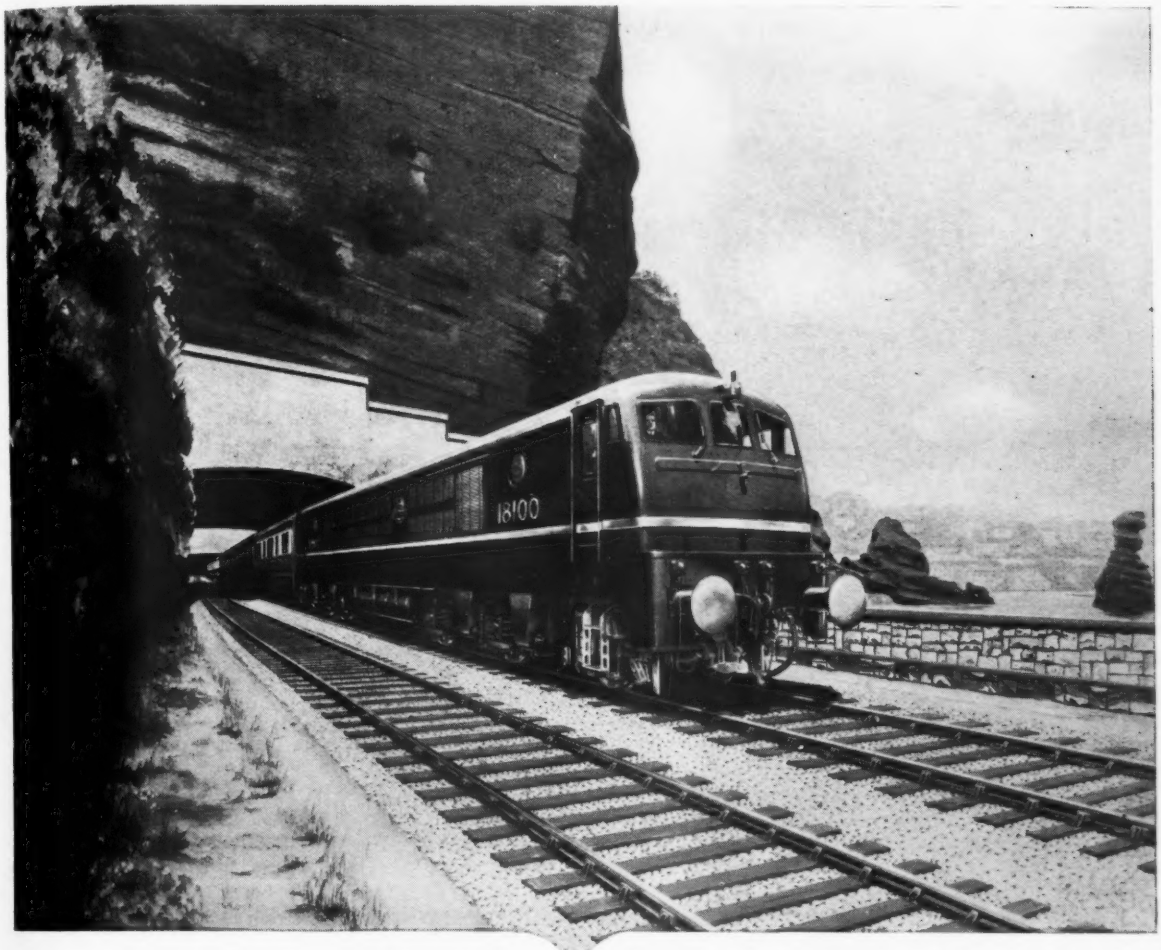
boiler and flue tubes in copper, brass and cupro-nickel ('Nicro', 'Koro-Metal')

copper tubes for general purposes

rods for staybolts in copper, 'Nicro', 'Koro-Metal'.

ICI IMPERIAL CHEMICAL INDUSTRIES LTD., LONDON, S.W.1

M.23



The First British-Built
GAS TURBINE ELECTRIC LOCOMOTIVE

Fifty years of experience in electric traction, together with fourteen years of intensive development of gas turbines, has resulted in the successful production of this Gas Turbine Electric Locomotive designed and built by Metropolitan-Vickers for work on the Western Region of British Railways. Although a new development, this locomotive has very many desirable features which have already been proved by experience.

Whether your problem concerns the choice of a gear wheel or a complete railway electrification scheme, the Metropolitan-Vickers organisation is ready to place at your service its technical competence and vast experience in traction matters

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFFORD PARK, MANCHESTER, 17
Member of the A.E.I. group of companies

METROVICK *Traction for more efficient transport*

Exide
BATTERIES

START THE GAS-TURBINE

of No. 18100

LOCOMOTIVE

The first British-built gas-turbine locomotive, made by Metropolitan-Vickers for British Railways, uses, as may be expected, an Exide battery for starting and auxiliary duties. The battery, of 48 cells giving 384 Ah. capacity at the 5-hour rate, has been especially designed for starting and auxiliary duties on gas-turbine and diesel locomotives. This is a task which demands exceptional starting performance at high rates, ability to withstand vibration, and great mechanical strength—demands which the Exide battery has proved its ability to meet in railway service all over the world.

A PRODUCT OF CHLORIDE BATTERIES LIMITED
EXIDE WORKS · CLIFTON JUNCTION · NEAR MANCHESTER

LAYCOCK PLASTICS

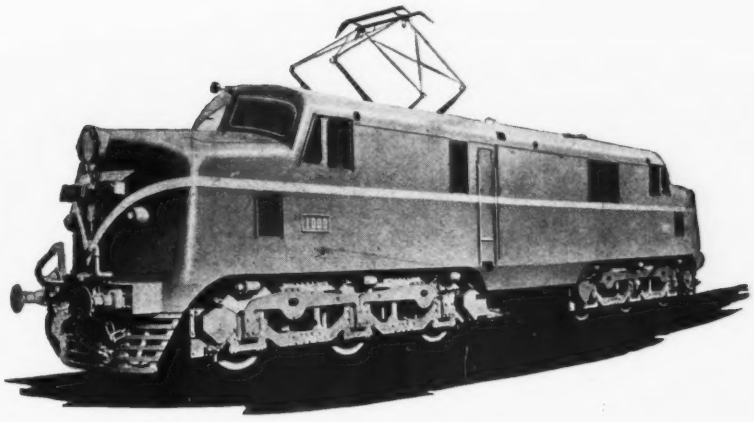
For the Railway Industry

LAYCOCK ENGINEERING CO., LTD., VICTORIA WORKS, MILLHOUSES, SHEFFIELD 8.

SOLID
FORGED & ROLLED STEEL
WHEELS

TYRES · AXLES · DISC CENTRES
AND COMPLETE PAIRS OF WHEELS AND AXLES FOR
LOCOMOTIVES · CARRIAGES · WAGONS

TAYLOR BROS
AND COMPANY LIMITED
TRAFFORD PARK STEEL WORKS
MANCHESTER
LONDON OFFICE: VICKERS HOUSE · BROADWAY · WESTMINSTER · SW1



3,000 h.p. electric locomotive for Estrada de Ferro Santos a Jundiai, Brazil, built by The English Electric Co. Ltd. and The Vulcan Foundry Ltd., equipped with 'Teloc' RT835 Speed Indicator & Recorder.

TO ENSURE EFFICIENT OPERATION OF

YOUR

ELECTRIC, STEAM OR DIESEL LOCOMOTIVES USE 'TELOC' RT 835 SPEED RECORDERS.

PROTECTS—

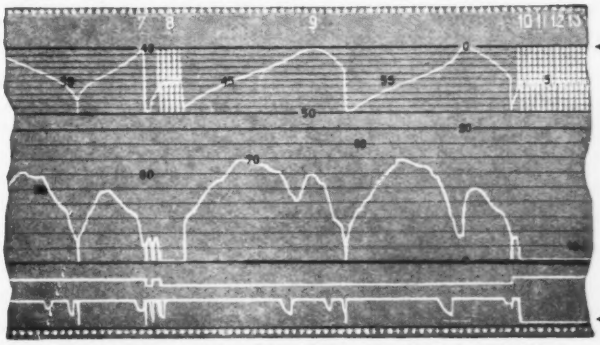
Manufacturers ✓
Railways ✓
Operating Staff ✓

GIVING ACCURATE RECORD OF

HOURS PUNCHED IN FIGURES

SPEED IN M.P.H. OR K.P.H.

DISTANCE COVERED IN MILES OR K.M.



MINUTES BY OBLIQUE LINE 10 MINUTES UP & DOWN

DIRECTION OF TRAVEL, OR CURRENT "ON" OR "OFF"

BRAKES APPLICATIONS RECORDED

PAPER FEED 5 M.M. PER MILE OR K.M. RUNNING 5 M.M. PER HOUR STANDING. SCALE APPROX. ½ FULL SIZE

TEL. NO. ABBEY 7575/6

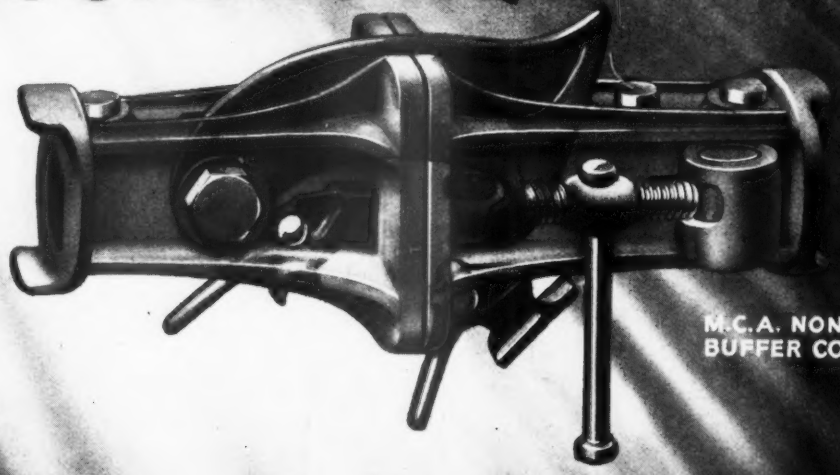
HASLER TELEGRAPH WORKS

26 VICTORIA STREET, LONDON, S.W.1

TELEGRAMS SIVAD, LONDON

A.B.C.

COUPLING EQUIPMENT



M.C.A. NON-SHOCK BUFFER COUPLER.

- A.B.C. AUTOMATIC BUFFER COUPLERS
- D.A. BUFFER COUPLERS
- NON-SHOCK BUFFERS, COUPLERS & DRAW GEAR
- M.C.A. BUFFER COUPLERS
- D.N. COMBINED CENTRE PIVOT COUPLERS
- GOODALL ARTICULATED DRAW GEAR
- C.S. & A.C.S. MINE CAR COUPLERS

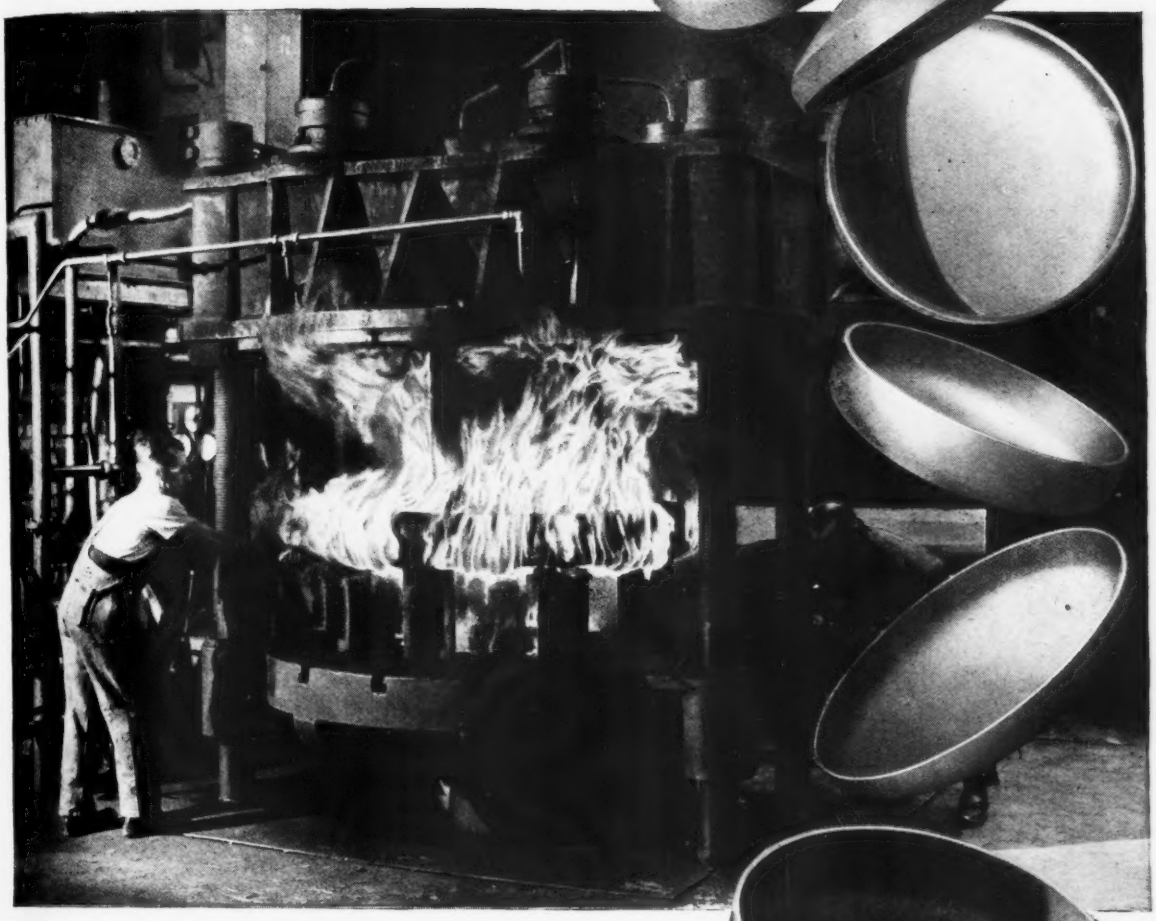
Designers, Patentees & Manufacturers,

A.B.C. COUPLER & ENGINEERING Co LTD

FALLINGS PARK WOLVERHAMPTON

Fallings Park 31295 *"Autobuff" Wolverhampton*

DISHED ENDS ?



OUT of the furnace and into the press goes the partially finished end . . . up comes the powerful press ring to form the required flange . . . and another Dished and Flanged End is ready.

Furnace and press capacity is available at Harvey's Greenwich works for the pressing of both light and heavy Dished and Flanged Ends. Diameters range from 6' to 9' 0", edges can be prepared for either welding or riveting. Manufacturers providing their own metal can obtain prompt delivery of ends to specification. For details and tables showing dimensions available, send for List RG 790.

Harvey

G.A. Harvey & Co. (London) Ltd. Woolwich Road, London. S.E.7

Quality controlled steel castings

made in the K & L Foundries are used exclusively for all wheels on the 4-8-2 type locomotives being built by the Vulcan Foundry Limited for the Gold Coast Railways.

SCOA-P WHEEL CENTRES ARE DESIGNED BY THE VULCAN FOUNDRY LIMITED FOR THE SOLE MANUFACTURERS IN GREAT BRITAIN . . .

K&L STEELFOUNDERS & ENGINEERS LIMITED

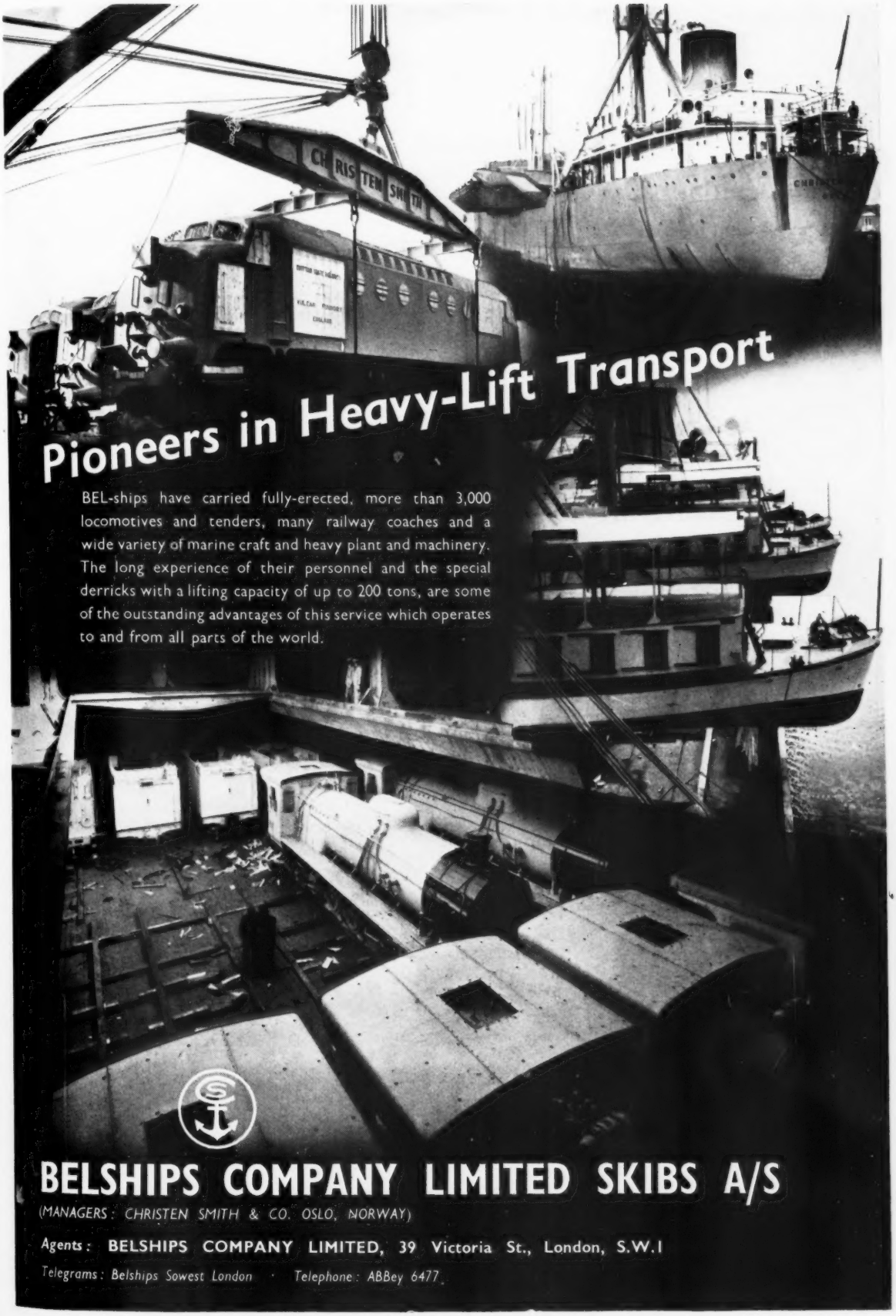
LETCHWORTH · HERTS

THE 600 GROUP OF COMPANIES

LICENCE GRANTED BY THE ORIGINAL DESIGNERS AND PATENTEES: THE STEEL CO. OF AUSTRALIA PTY. LTD.

Illustration by permission of The Vulcan Foundry Ltd.

SCP/KF65



Pioneers in Heavy-Lift Transport

BEL-ships have carried fully-erected, more than 3,000 locomotives and tenders, many railway coaches and a wide variety of marine craft and heavy plant and machinery. The long experience of their personnel and the special derricks with a lifting capacity of up to 200 tons, are some of the outstanding advantages of this service which operates to and from all parts of the world.

BELSHIPS COMPANY LIMITED SKIBS A/S

(MANAGERS: CHRISTEN SMITH & CO. OSLO, NORWAY)

Agents: **BELSHIPS COMPANY LIMITED, 39 Victoria St., London, S.W.1**

Telegrams: Belships Sowest London · Telephone: ABBey 6477.

FASTER & BETTER TOOLS

"SPEEDICUT" HIGH SPEED STEEL TWIST DRILLS

Proved in reliability over two generations for all drilling operations.

A really complete range of sizes in 18% Tungsten High Speed Steel . . . ·004in. to 4in. dia.

"SPEEDICUT C.T." drills of tough temper for construction work.

"SPEEDICUT" for general purpose drilling.

"SPEEDICUT SATIS" for maximum resistance to wear on high tensile and work-hardening alloys.

Your drilling problem may need drills of special design; we shall be pleased to make them and if need be arrange the visit of a Technical Representative.

Twist Drills · Reamers · Taps · Milling Cutters · Lathe Tools · Chaser Dies Segmental Saws · "Mitia" Carbide Cutting Tools · "Mitia" Carbide Saws Saws for all purposes · Files and Rasps Hacksaws · "Hardometer" Hardness Testing Machine · Twist Drill Point Sharpening Machine · "Crypto Atlas" Bandsawing Machine · "Mitia" Carbide Saw Sharpening Machine · And all other types of Engineers' Cutting Tools.

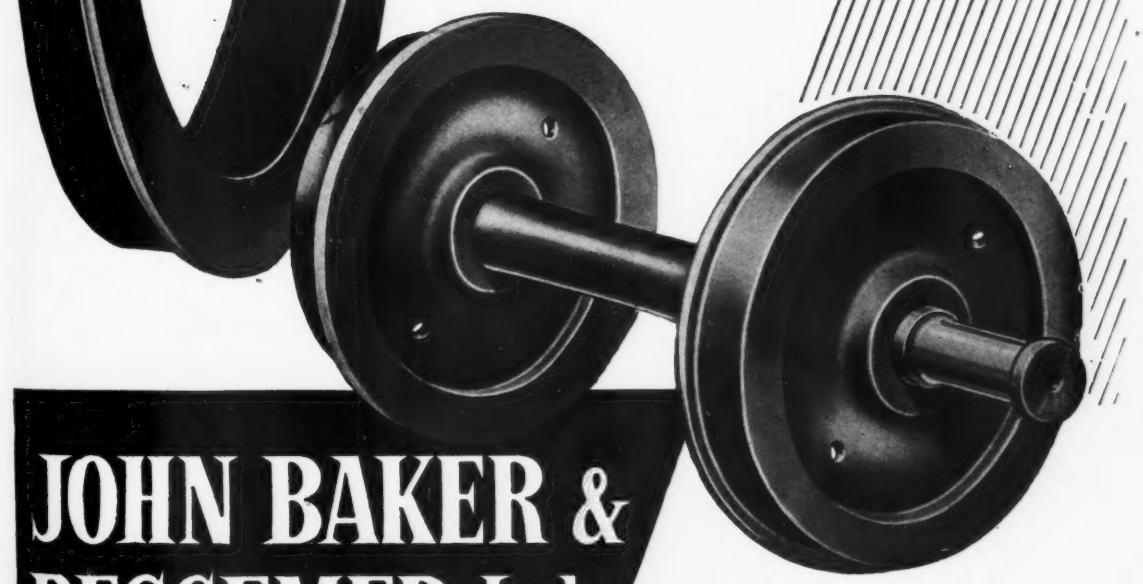
F B T

FIRTH BROWN TOOLS LTD.

SHEFFIELD

HIGH TENSILE TYRES & SOLID ROLLED WHEELS

for LOCOMOTIVES
CARRIAGES AND
TRAM CARS
Wheels & Axles



JOHN BAKER & BESSEMER Ltd.

KILNHURST STEEL WORKS

• ROTHERHAM • ENGLAND

TELEPHONE: MEXBRO 2154/5/6

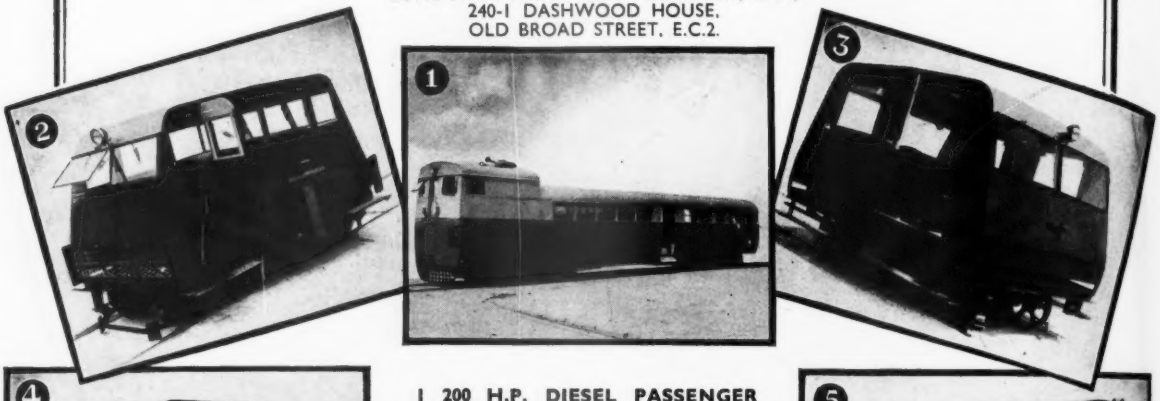
LONDON OFFICE: 9, Victoria Street, Westminster, LONDON, S.W.1

INDIA: Messrs. SAMUEL OSBORN (INDIA) LTD. Post Box No. 281, PATEL HOUSE, CHURCHGATE STREET, BOMBAY
SOUTH AFRICA: Messrs. ROGERS-JENKINS & CO. (PTY.) LTD., P.O. Box 654, MARSHALL & NUGGET STREETS, JOHANNESBURG
CANADA: Messrs. PEACOCK BROTHERS LTD., TOWN OF LASALLE, MONTREAL

D. WICKHAM & CO. LTD

WARE · HERTFORDSHIRE · ENGLAND

LONDON OFFICE: W. BAYLISS & CO., LTD.,
240-1 DASHWOOD HOUSE,
OLD BROAD STREET, E.C.2.



1 200 H.P. DIESEL PASSENGER CAR.

2 TYPE 40 SALOON INSPECTION CAR.

3 TYPE 30 SALOON INSPECTION CAR.

4 TYPE 18A HEAVY DUTY INSPECTION CAR.

5 TYPE 27A MEDIUM DUTY GANG TROLLEY.

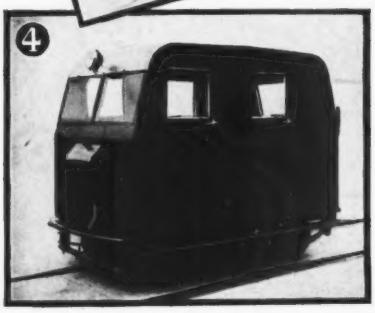
6 TYPE 18A HEAVY DUTY GANG TROLLEY.

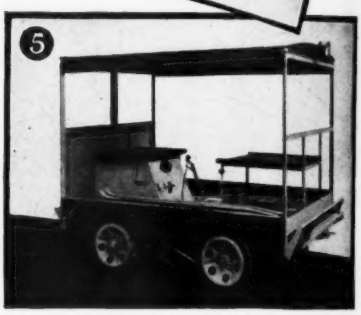
7 TYPE 8S(B) LIGHT INSPECTION CAR.

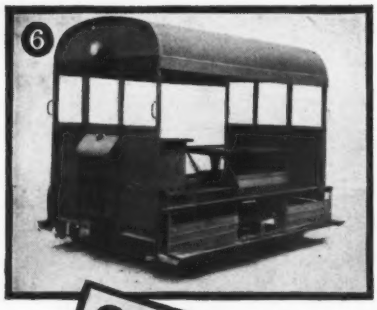
8 TYPE 8S(BB) LIGHT INSPECTION CAR.

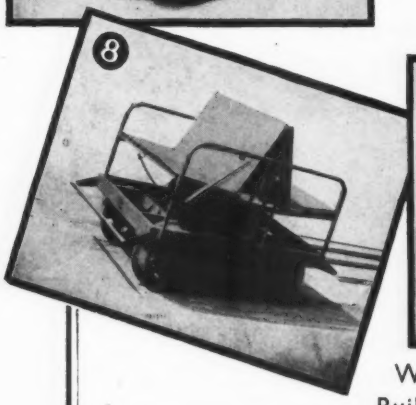
9 TRACK GRINDER.

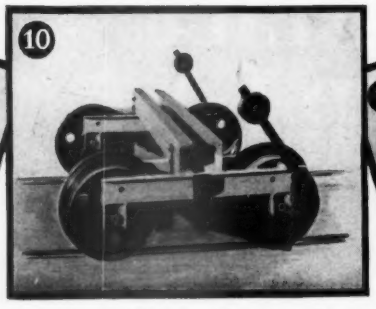
10 DIPLORY CARRYING BOGIE.









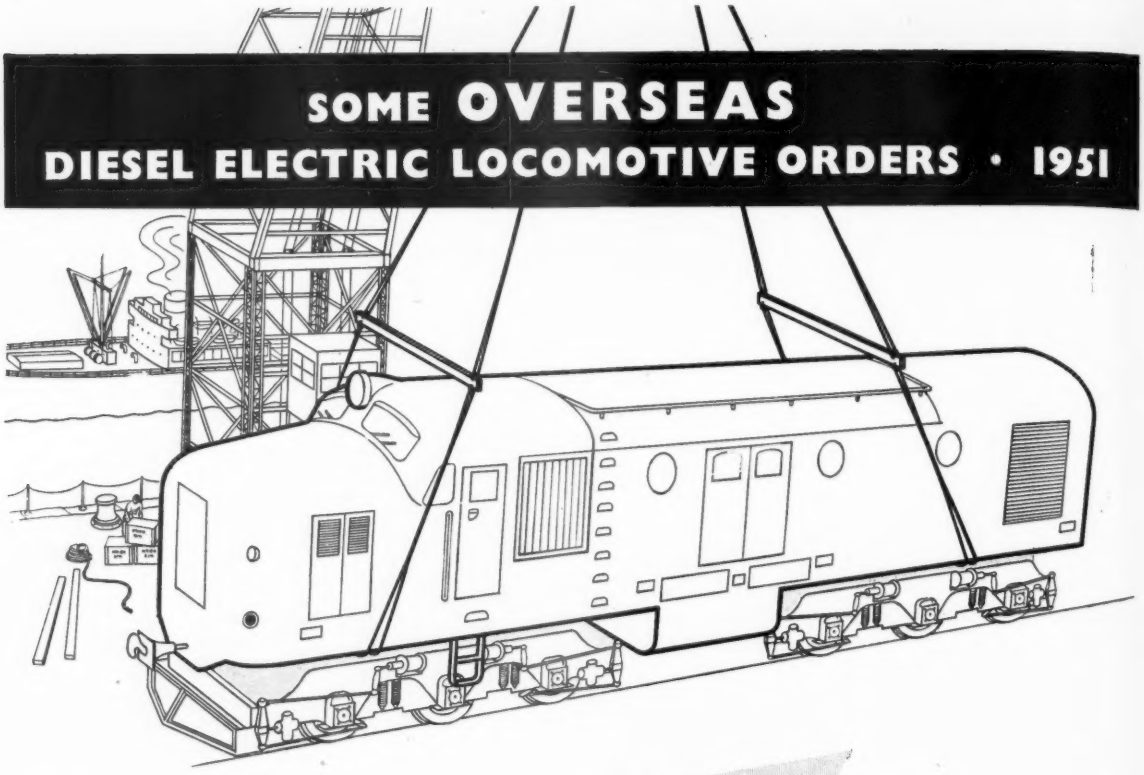


Wickham Cars, Designed and Built by Specialists, are available for worldwide service under all climatic grade, and altitude conditions.

THE VULCAN FOUNDRY LTD NEWTON-LE-WILLOWS LANCASHIRE

dmVF4

SOME OVERSEAS DIESEL ELECTRIC LOCOMOTIVE ORDERS · 1951



AUSTRALIA

The Commonwealth Railways have placed an order with the Birmingham Railway C. & W. Co. for 14 Diesel Electric Locomotives of 955 b.h.p. for general service between Port Augusta and Alice Springs. The Locomotives will be powered by SULZER Engines and fitted . . . . **WITH CROMPTON PARKINSON TRACTION EQUIPMENT**

AFRICA

An initial order for 3 Diesel Electric Locomotives of 1000 b.h.p. for service in Sierra Leone has just been placed with the Birmingham Railway C. & W. Co. They are A1A-A1A Locomotives of 3′ 6″ gauge. They will be powered by SULZER engines and . . . **WILL HAVE CROMPTON PARKINSON TRACTION EQUIPMENT**

SPAIN

Twenty 350 b.h.p. Diesel Electric Shunting Locomotives have been ordered by the R.E.N.F.E., the Spanish National Railways. These SULZER locomotives will be built and erected in Spain . . . **THEY WILL HAVE CROMPTON PARKINSON TRACTION EQUIPMENT**

Crompton Parkinson LIMITED

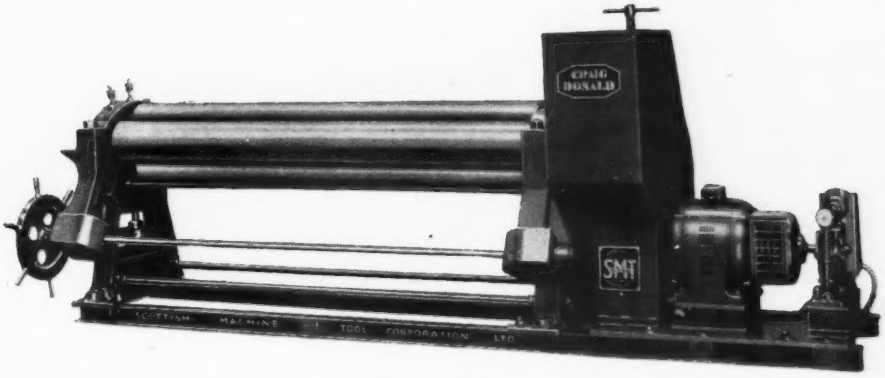
TRACTION DIVISION, CHELMSFORD, ESSEX

Telephone : Chelmsford 3161 *Telegrams : Crompark, Chelmsford.*

TRACTION EQUIPMENT

CRAIG & DONALD

Plate Curving Rolls



Unilateral type Rolls for light sheets. Made in sizes up to ¼in. thickness and 8ft. length.

SCOTTISH

MACHINE TOOL CORPORATION

LIMITED

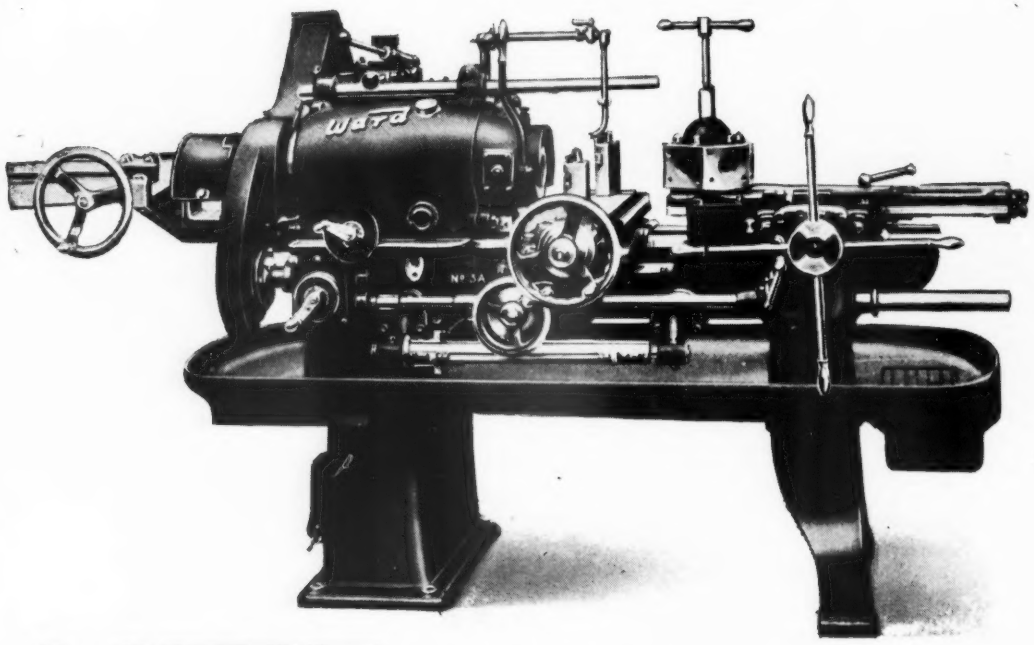
Head Office **124 ST. VINCENT STREET, GLASGOW**

Telephone: City 6931 *Telegrams: Mactools, Glasgow*

London and Export Office: 58, VICTORIA STREET, LONDON, S.W.1. *Victoria* 2106

Leeds Office: 75, WENSLEY ROAD, LEEDS. *Leeds* 41913

For Maximum Production



Ward No. 3A CAPSTAN LATHE

Please write for particulars of our full range of Capstan & Turret Lathes

Height of centres	...	6½in.
Spindle hole dia.	...	1¾in.
Auto. chuck will take dia.		1½in.
Swing over bed, max. dia.		13⅛in.
Swing over cross-slide	...	7 in.

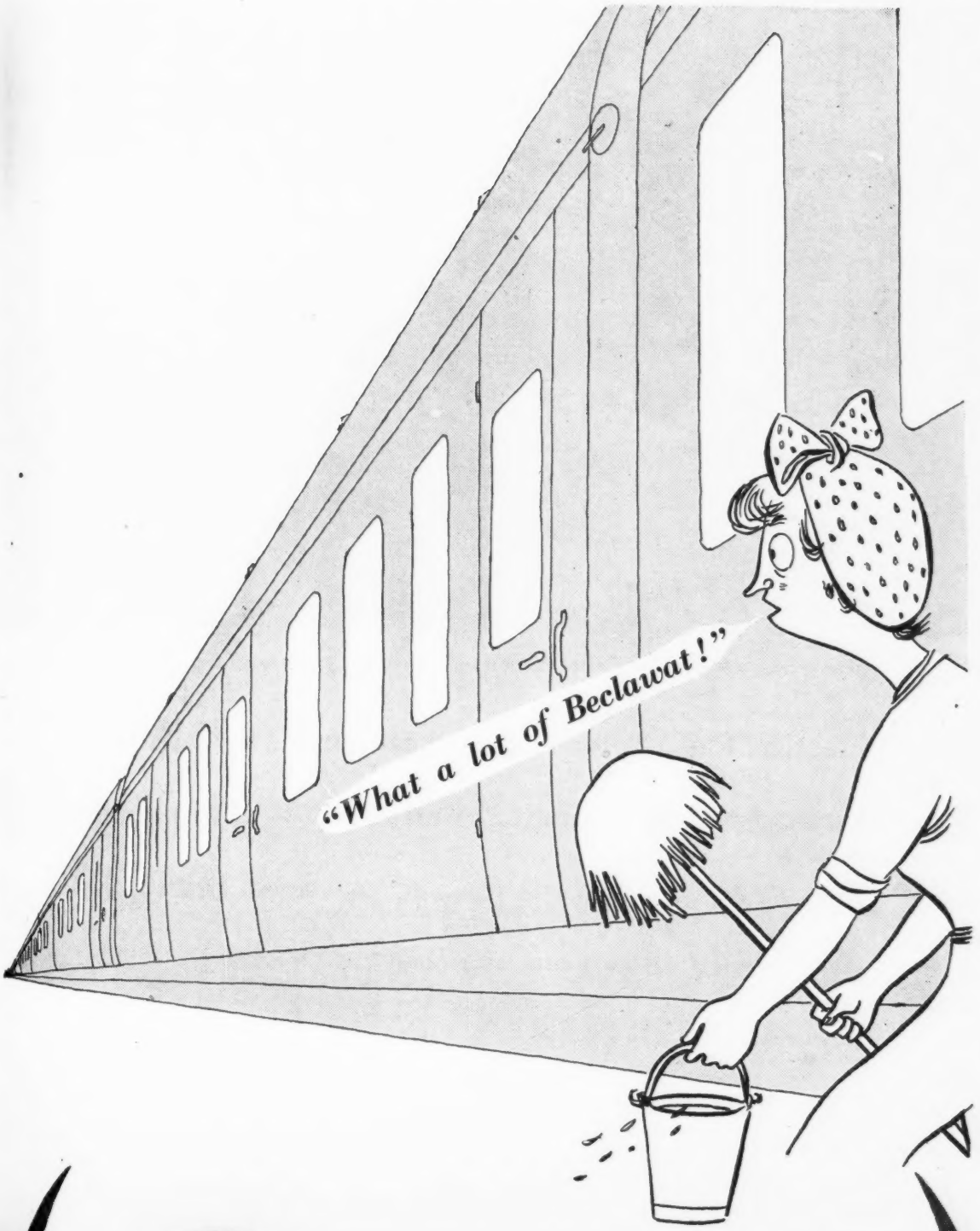
Ward machines are designed and built to get the best out of tungsten carbide, their metal removing capacity being limited only by the cutting tools used.

H.W. WARD & CO. LTD

SELLY OAK BIRMINGHAM 29

TELEPHONE SELLY OAK 1131

WS65



BECLAWAT
REGD. TRADE MARK

Windows for Trains

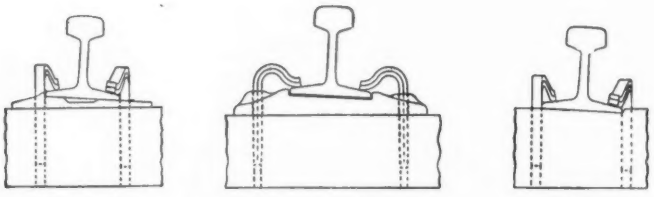
BECKETT, LAYCOCK AND WATKINSON LTD.
ACTON LANE, LONDON, N.W.10.

217-50-R519

Reproduced by kind permission of C. H. Slater, Esq., Civil Engineer, Great Northern Railway (Ireland).

Elastic Rail Spikes give resilience to absorb vertical rail movement. Rail creep is eliminated and track maintenance costs are reduced.

Designs are available to suit existing Track Construction.



Single shoulder baseplate. Double shoulder baseplate. Without baseplate.

ELASTIC RAIL SPIKE CO. LTD.

117, FENCHURCH STREET, LONDON, E.C.3.

Telephone: ROYAL 4111. Cables: ELASPIKE, LONDON

THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal ESTABLISHED 1835 · RAILWAY RECORD.
RAILWAYS ILLUSTRATED · The Railway Official Gazette

33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1.
Telephone: WHItehall 9233 (12 lines) *Telegrams: "Trazette Parl, London"*

BRANCH OFFICES
GLASGOW: 87, Union Street. . . . . *Central 4646*
NEWCASTLE-ON-TYNE: 21, Mosley Street . . *Newcastle-on-Tyne 22239*
MANCHESTER: Century House, St. Peter's Square . . . *Central 3101*
BIRMINGHAM: 90, Hagley Road, Edgbaston . . . *Edgbaston 2466*
LEEDS: 70, Albion Street . . . . . *Leeds 27174*

Annual subscription £4 10s. 0d. post free. Single copies, Two shillings
Registered at the G.P.O. as a newspaper. Entered as second-class matter in U.S.A.

Vol. 96] FRIDAY, FEBRUARY 1, 1952 [No. 5

CONTENTS

	PAGE
Editorial Notes	113
Asphyxia in Tunnels	115
Victorian Railways	116
Signalling on Single Lines	116
Freight Movement on British Railways	117
Letters to the Editor	118
The Scrap Heap	120
Overseas Railway Affairs	121
Cheaper Single Railway Fares	123
British-Built Gas-Turbine Locomotive	125
Personal	131
Permanent Way Institution Annual Meeting and Dinner	137
Notes and News	138

Railway Steel Supplies

IT is becoming increasingly clear that, unless there is some major change in the government allocations of steel to the railways, the effects will be extremely grave. Mr. John Elliot, the Chairman of the Railway Executive, made brief mention of the matter when he spoke at the annual winter dinner of the Permanent Way Institution on Saturday last. He indicated that much of the allocation would be devoted to track maintenance and said that if the present cuts in supplies were implemented the result for British Railways would be serious indeed. Nevertheless, at the worst, it would still be possible to relay the number of miles which permanent way men regarded as essential for reasonable maintenance. Mr. Elliot was addressing an audience primarily concerned with the track, and no doubt for this reason he made no comment on the other sections of the railways' business, the efficiency of which is dependent on adequate supplies of steel. Locomotives, carriages and wagons all require substantial tonnages of steel, not only for new construction but also for maintenance and renewal. There can be little doubt that it is in these directions that the railways will be hit hardest. It is not unlikely that unless there is a very substantial easement in the present stringency of steel supply to the railways, it will be necessary to make very large cuts in the locomotive and wagon building programmes. Some building of these vehicles will have to be done to meet essential demands. In the case of passenger stock an even more serious situation may arise. The present concentration on the movement of goods traffic might result in the abandonment of new carriage construction. If this were so, and if at the same time locomotive and wagon building were to fall, the railways would be subjected to a very serious setback in their efforts to rehabilitate themselves. There is good ground in the national interest for the presentation to the government of the most forceful arguments in favour of a better allocation of steel to British Railways. No time or opportunity should be lost in impressing on the Cabinet the essential part which the railways must play, not only in the rearmament programme, but in the transport of materials and goods destined for the export market. The presence of Lord Leathers in the Cabinet should ensure that the claims of the railways are made known at the highest level. For this to be effective Lord Leathers must be supplied, through the Minister of Transport by the British Transport Commission, with all the necessary data to enable him to present the railways' case.

Taxation of Profits

THE excess profits tax, which the Government announced in November its intention to introduce during rearmament, was criticised last week by the Engineering Industries Association. The encroachment of taxation on the resources of industry, it was maintained, already was too great and endangered capital efficiency, and E.P.T. destroyed the incentive for economy in production. The Association suggested a progressive addition to standard profits of 10 per cent. a year to encourage efficiency and growth, which might also help to counter the effects of inflation which continues, and allowance on increases in capital employed of not less than 15 per cent., as this was the yield of earnings necessary for maintenance of efficiency. The Association of British Chambers of Commerce also made recommendations on the taxation of profits. These include a review of the incidence of profits tax before any new E.P.T. is imposed, and a revision of the present method of calculating taxable profits. Like the Engineering Industries, the Chambers of Commerce consider that a tax on excess profits by its nature destroys incentives to efficiency. When levied by computing taxable income regardless of inflation such a tax, they rightly argue, is simply on capital and not on income. What is essential now is that any new tax should allow sufficient profits to be ploughed back in industry, to maintain and if possible increase production.

Handling Winter Freight Traffic

THE indications earlier this week were that the freight traffic situation on British Railways was well in hand despite the recent cold spell. Wagon standages at inter-Regional junctions generally were reported as normal or even below normal, and the movement of traffic fluid. In South Wales, in the Western Region, an area particularly liable to traffic congestion because of restricted outlets to other parts of the system, wagons held up averaged 3,369 last week, compared with a weekly average of 3,600 in the milder weather in early and mid-December—before the average was raised by Christmas holiday abnormalities. The smaller amount of coal moved from the mines last weekend, 375,820 tons against 400,510 for the previous weekend, was due mainly to reduced coal output. The rate of discharge of wagons and of terminal handling of freight during the past few days has been about the same as last year, although icebound roads and other factors increased the difficulties of wagon clearance. So far the cold weather has not brought any marked increase in sickness. There are still several weeks of possible severe winter weather ahead. In addition to the meritorious efforts of the railwaymen, favourable factors this winter have been the clear start in the matter of standages and the special co-ordinated measures to deal with traffic.

A Banker on Railways

THE Chairman of Barclays Bank, Mr. A. W. Tuke, had some caustic remarks to make about nationalised railways in his recent address to his shareholders. He said there had been a considerable decline in efficiency since nationalisation and that the service now given com-

pared unfavourably with that when the industry was in private hands. Referring to higher fares and charges, he said that the management was faced with the operation of an economic law to which the planners appeared to have no answer. Their usual remedy of raising the price failed them when the public could travel by road or even stay at home. Mr. Tuke did not explain that, notwithstanding recent increases in railway charges, their present level was still less than the general advance in wholesale and retail prices. He made no reference to the difficulties which the railways have had to surmount or of the restrictions with which they are still faced, and which may become worse. There is good ground for seeking improvement in railway facilities and services—there is ample scope for it—but this will not be achieved by speeches such as Mr. Tuke's. A good job is being done by the great body of railwaymen under extremely difficult conditions and some recognition of that would not be out of place.

Permanent Way Institution

LAST year members of the Permanent Way Institution paid a visit to Holland and were afforded an opportunity of inspecting many of the principal features of the Netherlands Railways system, one of the most progressive in Europe. At the Institution's annual winter dinner last Saturday, the principal guest was Mr. F. Q. den Hollander, the President of the Netherlands Railways Company who, accompanied by Mr. J. L. A. Cuperus, Chief, Way & Works Department of the system, had travelled to London especially to attend the function. Besides being the head of the Netherlands Railways, Mr. den Hollander has many other industrial and business interests in Holland, and the calls on his time are many. It was as typical of his courtesy as it was appreciated by members of the Permanent Way Institution that he should have made the journey so that he could be present at the dinner, although he had to return almost immediately to Holland. The gratification which was felt by the Institution was well expressed by several speakers at the dinner, notably Lt.-Colonel H. B. Everard, the President, Mr. John Elliot, Chairman of the Railway Executive, and Mr. J. C. L. Train, Member of the Railway Executive and a Past-President of the Institution. Some report of the proceedings is given elsewhere in this issue.

Area Holiday Guides

THE five British Railways area holiday guides for 1952 provide, for one shilling, in the usual attractive form a compact mass of holiday information on the area covered by each guide. There is a large selection of photographic illustrations, well chosen and reproduced. The division of England and Wales into four areas which do not and cannot correspond with the five Regions of British Railways south of the Border, with Scotland as a fifth area, probably is the best solution; it would be impracticable, for instance, to consider as one area for holiday purposes the territory served by the London Midland Region. The question which Region to approach for railway information is answered by inviting the inquirer to address the Commercial Superintendent of the "Region controlling the station at which the proposed journey will commence," and also any other of the Regions. This is an improvement on last year, when inquirers were directed to a Region which could correspond only roughly with the holiday area of England or Wales concerned.

Closing of Branch Lines

THE acceleration last year in the process of closing branch lines and stations deemed unremunerative is shown in recent figures. During 1951, 94 branches, including some 300 stations and totalling nearly 750 route-miles, were authorised to be closed completely or for passenger traffic only. This compares with some 570 route-miles during the first three years of nationalisation. The machinery for the consideration of each line on its own merits seems to be working satisfactorily. The objections in each case are largely from local interests which have contributed to the projected closing by failure to make adequate use of the line concerned. The Transport Users' Consultative Committees in the different areas of the country, as is well known, exist *inter alia* to make recommendations on closings; it is strange, therefore, that a local government official in a recent letter to *The Times* on the final closing of the Canterbury and Whitstable line should have been surprised that the local Committee was not a tribunal. The policy is not one of indiscriminate closing; each case is examined on its own merits, when the nature and cost are considered of the alternative mode of transport to be provided. As we have pointed out before, branch lines can and do act as feeders—which greatly complicates the assessment of their supposed redundancy—and they can sometimes be made, with effort, to increase their yield to the extent of justifying retention.

Deterioration of Timber in Sea Water

THE latest information on the deterioration of timber in sea water is contained in a report by the Sea Action Committee of the Institution of Civil Engineers, a copy of which we have received from its Chairman, Sir William Halcrow. In all home waters timber is attacked by the marine borers limnoria and chelura, and also by teredo in warmer southern British waters. There is no such attack in fresh, slightly-salt, or sewage-contaminated water, but the timber there suffers from fungoid destruction unless continually submerged. The timbers naturally resistant to fungal decay are greenheart, oak, and pitch pine, which, like creosoted softwoods, last for 20 or 30 years. No species of timber is immune from marine borer attack in pure sea water, but greenheart, pyinkado, kauri, turpentine, totara, and jarrah are resistant to it, whereas oak, elm, and softwoods are not. Pressure-creosoting usually, but not invariably, affords protection to softwoods. Though pitch pine is more resistant to borers when untreated than Baltic redwood or Douglas fir, it is also more resistant to creosote penetration, and therefore less resistant than more absorbent treated softwoods.

Cold Rolling of Rails

THE exceptional wearing capacity of some of the rails rolled in the earlier days of steelmaking has often been explained, in part at least, by the theory that in their composition various hardening elements were present in larger percentages than would have been considered safe later, but that the relatively light traffic carried was a safeguard against fracture. Instead, their service in these relatively easy conditions eventually toughened them to such a degree, as the result of cold rolling or work hardening, as to give the rails a valuable resistance to both wear and shock as the harder wearing conditions developed. At one British steelworks before the war, the possibility was examined of applying cold rolling to the running surface of new rails to toughen the steel and increase resistance to abrasion, but the idea had to be abandoned because of the additional handling costs. Certain American railways are now making a practice of laying new rails in straight tracks, and after some years of service in moderate traffic conditions, are transferring them to curves which carry heavy traffic at low speeds. It is claimed that the gain in life due to cold rolling in the original location more than balances the cost of transfer.

Electric "Push-and-Pulls" in France

WHEN electric multiple-unit sets began to displace the steam push-and-pull train, it would have been thought unlikely that electric traction would in time be obliged to adopt the push-and-pull system as an expedient for meeting traffic demands. This in effect is what has occurred in the Paris suburban area of the S.N.C.F. South-Eastern Region, where services are being worked by modified sets of former steam train stock hauled by electric locomotives, pending delivery of new multiple-unit trains. Reference to this system was made in our August 10, 1951, issue. Eighteen four-coach sets have been formed by con-

version of all-steel steam suburban stock dating from the late 1930s, and each set is coupled permanently to a Bo-Bo locomotive of a class dating back to 1924, normally used today on light goods work in the South-Western Region. The controls have been removed from one cab of each locomotive and installed in a driving compartment at the other end of its set of coaches. Two sets may be coupled for rush-hour working, the second locomotive then being in the middle of the formation.

Electro-Mechanical Signalboxes

THE introduction of the new equipment in the signalbox at Port Eglinton, Scottish Region, which was described in our January 25 issue, calls to mind the Sykes "electro-mechanical" apparatus applied there, and at the nearby large terminus at St. Enoch, at the opening of this century, in which full-size levers worked the points, and miniature ones in the form of slides, mounted over them, the signals. There were 400 such slides in the St. Enoch box. This system was used in a few other installations, the most important being that at Victoria Station, London. The general idea involved later attracted attention in America and, in apparatus of greatly improved design, found some favour there where full power working was held not to be justified. In recent years it has been adopted in France for signalboxes of medium importance, using the half-revolution type of mechanical point lever, combined with small electrical handles. Our more modern installations, in which a panel is mounted above a mechanical frame, can be regarded as a development of the original idea of W. R. Sykes, the elimination of mechanical interlocking between the two halves of the apparatus bringing considerable simplification and rendering maintenance easier.

Two Defects in a Treadle Circuit

THE accident at Stobcross on the Glasgow Central underground line on June 9, 1951, was very unusual in that the forgetfulness of the signalman was accompanied by two danger side failures in the treadle releasing circuit of the block apparatus, so that on thinking he must have omitted to send "train of section" and going to his instrument he found it unlocked, which strengthened his delusion that a train must have passed and enabled him to accept the colliding train irregularly. He had forgotten also to comply with a local instruction regarding the pulling off of a tunnel home signal. These and certain circumstances peculiar to the case are brought out in Colonel D. McMullen's report which is summarised in this issue. The signalman was past retiring age, but, by some oversight, had not been sent for medical examination on re-engagement. When one was made, it showed him to be liable to momentary lapses of memory, and no longer fit to be employed on such responsible work.

No More Lima Locomotives

MORE than 70 years of locomotive building were brought to an end on September 11, 1951. It was in 1879 that Lima turned out its first locomotive from a shop which until then had been devoted to sawmill machinery. Lima came well into the locomotive business during and after the 1914-18 war by building standard 2-8-2 locomotives for the U.S. Government, but became best known by some outstanding designs of later years—the "A 1" 2-8-4 of 1925, purchased by many railways, various 4-6-4, 4-8-4, and 2-10-4 classes, the handsome "Daylight" class 4-8-4s of the Southern Pacific, and the articulated Chesapeake & Ohio 2-6-6-6 class, which on test have developed up to 8,000 h.p. After the recent war, diesel production began to supplant steam to such an extent that the Lima Locomotive Works was compelled to merge with a diesel-building firm to form the Lima-Hamilton Corporation in 1948; two years later came the merger with the Baldwin Locomotive Works as the Baldwin-Lima-Hamilton Corporation. This combine is to concentrate Lima production on cranes and power shovels, and the 7,823rd locomotive, a 2,500 b.h.p. diesel for the Pennsylvania, is the last.

Metropolitan-Vickers Gas-Turbine Locomotive

THE delivery of the Metropolitan-Vickers gas-turbine locomotive ordered by the former Great Western Railway marks a further important stage in the development of this form of motive power. Considerable advantage should accrue as a result of the experience already obtained from the operation of the Brown-Boveri gas-turbine locomotive, described and illustrated in our May 5, 1950, issue, which has been working on the Western Region, British Railways for nearly two years. This locomotive is earning at present about 2,700 miles a week. The latest gas-turbine locomotive has been designed for hauling the heaviest passenger trains on the Western Region main routes, particularly that between London and Plymouth, and at speeds up to 90 m.p.h.

The section of the main-line between Newton Abbot and Plymouth presents particularly arduous conditions over which fast running is scheduled, culminating in a gradient of 1 in 36, between Newton Abbot and Totnes. To work the heaviest passenger trains over these heavy gradients it is necessary to provide for a maximum starting tractive effort in the region of 60,000 lb. and with a stipulated axle load requiring six driving axles. The same considerations led to fixing the continuous rating at 30,000 lb. tractive effort. Electrical transmission was adopted as the only practicable and reliable means of satisfying those conditions. The selection of the nominal rating for the power unit was based on those and other considerations, and the power actually available is more than adequate to give the timings required by the Western Region.

The design of the turbine, reduction gear, and electric transmission equipment is based on a nominal output of 3,500 h.p. at the turbine coupling. The blade profiles limit the continuous output to between 3,100 h.p. and 3,200 h.p. In the event of the full nominal output being required, this can be made available by changing certain of the existing blades with blades of different profile. The automatic control scheme fitted to this latest gas turbine locomotive should bring the driving technique within the capacity of the regular staff without specialised training. This is especially so when combined with the experience already gained with the Brown-Boveri gas-turbine locomotive. The locomotive has been equipped with Western Region automatic train control.

Asphyxia in Tunnels

A NOTORIOUS case of asphyxia in a British railway tunnel occurred on November 20, 1929, on the then Somerset & Dorset Joint line. Smoke and fumes from the engine of a goods train to Bath overcame the driver and fireman as the engine was labouring on the 1 in 100 adverse gradient in the single-line Combe Down Tunnel; the engine got out of control on the descent from the summit shortly beyond the tunnel, and the train was derailed at high speed. The main contributory factor seems to have been a combination of adverse circumstances such as smoke from trains immediately preceding, an engine labouring heavily, possible slipping, high humidity of the atmosphere, absence of wind, the steep adverse gradient in the tunnel, and the absence of ventilation shafts in the course of about a mile. The fact that the engine was running tender first seems to have made no difference. Another serious case occurred in Southern Italy early in 1944, in abnormal war conditions, when the few civilian passenger trains were grossly overloaded and overcrowded, with passengers in some cases riding on the buffers and even on the roofs. The engine of a train on the Naples-Taranto line stalled in a single-line tunnel near Potenza near the summit of an adverse gradient. Some time passed before the engine crew realised that they were not moving forward. Panic ensued as passengers struggled to escape from the tunnel and some 480 died from asphyxiation.

The subject of asphyxia in tunnels was discussed recently at the International Congress of Labour Medicine in Lisbon in a report presented by Don Luis Blanco Valldeperez.

Chief Engineer, and Deputy President of the Central Committee of Labour Hygiene & Safety, Spanish National Railways. Deaths of crews of steam locomotives, he stated, have been caused by the working of slow and heavy trains through tunnels of small dimensions constructed in Spain about a century ago. The first preventive measures taken have been the banning of more than two locomotives on any one train on heavily-graded lines, reduction of the load to facilitate higher speed, and improvement in the quality of locomotive fuel.

Carbon dioxide, sulphur dioxide, carbon monoxide, and steam emitted by the engine were considered as possible causes of asphyxia: Dr. Piga, of the Spanish Institute of Legal Medicine & Toxicology, stated his conclusion that carbon monoxide was the cause, with the other three substances as possible contributory causes. Because carbon monoxide cannot be arrested by any form of filter, the Spanish National Railways designed respirators comprising a supply of fresh air under pressure from steel cylinders. The equipment differs for driver and fireman. That for the former consists of a leather hood on the principle of a diver's helmet, with a wide front glass; the lower edge of the hood is tucked beneath the driver's clothing. The fireman's respirator is light, covering only the lower part of the face. Since the introduction of this apparatus, no further deaths have occurred from asphyxia.

Examination of atmospheric conditions in tunnels resulting from the combustion of locomotive fuel showed that when the speed of a large locomotive in a tunnel falls below 10 m.p.h., the proportion of oxygen in the air drawn into the firebox falls from 21 to 17 per cent. Slow combustion produces more carbon monoxide than a bright fire, with consequent greater risk to the engine crew.

More radical measures adopted by the Spanish National Railways are the easing of gradients through tunnels where the speed of steam trains is likely to drop on the ascent to 10 m.p.h., and electrification of the sections of line concerned. It has not been practicable to improve the ventilation of the tunnels, which for topographical reasons would have been very costly compared with the other measures adopted.

Victorian Railways

THE report for the year ended June 30, 1951, of the Victorian Railways Commissioners, of which Mr. R. G. Wishart is Chairman, opens with a reference to the two-months' strike at the close of October, 1950, and to the withdrawal in February, 1951, of coal ships, both of which seriously interfered with railway services. In addition continually rising working costs—in wages alone, £2,136,000 in a year—far outweighed the £1,000,000 of additional revenue contributed by increased charges. Goods and livestock carried totalled 7,539,166 tons, 1,585,974 less than in the previous year.

Because of the coal shortage, and the difficulty of obtaining supplies more locomotives are being equipped for oil-burning, and equipment is being obtained for the conversion of Class "X" locomotives to burn pulverised brown coal. Electrification of the Gippsland line, the purchase of diesel-electric main line and shunting locomotives, and the extensive use of diesel railcars are now being carried out and will help to ease the fuel problem. The labour shortage gave cause for concern; and it is estimated that 5,000 additional staff is required.

The result of the year's operations was a deficit of £2,786,411, compared with one of £186,057 in 1949-50. Some of the principal results appear in the following table:

	1949 50	1950 51
Average miles of line	4,692	4,687
Train-miles	17,549,489	14,574,809
Passenger journeys	182,101,351	141,312,589
Goods and livestock, tons	9,125,140	7,539,166
	£	£
Passenger, parcels, etc., revenue ...	8,122,409	7,225,034
Goods and livestock, revenue ...	10,816,864	9,992,509
Total earnings	22,050,468	20,446,260
Working expenses	19,983,597	20,810,733
Net earnings	2,066,87	—364,473

In the year under review, the total annual expenditure was no less than £12,000,000 than in 1945-46; of this sum the wage bill accounted for nearly £9,000,000. During the same period fares and freights were increased by about £7,000,000. Approval was given for increased fares and rates from December 18, 1950. The average all-over increase in charges was approximately 11 per cent.

Road transport was called on to undertake much passenger carrying and goods haulage during periods of interruptions to railway services, particularly the eight-week strike. The report states that the experience showed that road transport, "while serving a valuable purpose, cannot replace railway services and that, without railways, the economy of the State would be completely unbalanced."

The strike and the restrictions imposed by the shortage of coal supplies caused a heavy loss of traffic; goods traffic (7,042,966 tons) was down by 16 per cent. and livestock (496,200 tons), by 31 per cent.

The order for 1,500 h.p. main line diesel-electric locomotives was increased from 17 to 26, and 25 diesel-electric shunting locomotives were ordered. Because of an expected increase in traffic on the Gippsland line, now being electrified, eight more electric locomotives, making a total of 25, are being ordered. Although civil engineering work was still retarded by shortage of labour and materials, progress was made with some projects, particularly the regrading and doubling of the Gippsland line.

In 1949, 1,000 pre-cut houses for staff were ordered from the United Kingdom. This order has been increased to 1,500. At the end of the year 392 had been completed; 321 were occupied by British railwaymen immigrants and 71 by members of the existing staff. Two officers were sent to Europe to engage approximately 3,000 men who will be accommodated in hostels and camps.

One of the outstanding successes of the State centenary celebrations was the "Centenary-Jubilee" train which made a 6,000-mile tour of the country and was inspected by 547,978 persons. The train included a Victorian railways exhibit which portrayed the growth and development of the railways and their influence on the prosperity of the State. Officers visited Great Britain and the United States to survey developments in suburban electric rolling stock and study the operation and maintenance of diesel-electric motive power.

Signalling on Single Lines

PROBABLY nothing brings out so well the extent to which local conditions, with their manifold variations, as well as the habits of mind and legal requirements in any given country, can react on the type of signalling to be adopted as does the problem of how to work single lines in the most efficient manner. This was realised quite early in the development of railways in this country. The first main lines were built as double tracks, but in 1841 the inventor, W. F. Cooke, associate of the physicist Wheatstone, issued a booklet entitled "Telegraphic Railways" in which he pleaded that if a safe way of operating single lines could be devised, railway communication could be made available to many more places by building single instead of double-line routes, so obtaining considerably greater benefits for the same capital expenditure.

This object was to be achieved by applying electric telegraphy, then newly become commercially available, but preferably in a special form which Cooke installed on the Norwich and Yarmouth line, under which the condition of every single-line section was indicated continuously at every station. To do that, with the facilities then available, was very costly in line wires, and the arrangement apparently found no further application, although the ordinary telegraph became used to a considerable extent to regulate the working on single lines. Some serious accidents, notably those near Norwich in 1874 and Radstock in 1876, showed how great was the risk of mistake, and eventually the train staff and ticket, then the electric train tablet, and later other token systems were introduced and became formally recognised, together with the little used "one engine in steam" system, as the only permissible methods of controlling passenger traffic on single lines in Britain.

Elsewhere, this development followed different courses, where the carrying of a tablet or staff by each train was held to be undesirable, or was even impracticable. Thus, there arose, in addition to " token " methods, others which have come to be known as " non-token " systems, of which there is a considerable variety. Several aspects of this question were dealt with in a paper on non-token working, read by Mr. A. N. McKillop at a recent meeting of the Institution of Railway Signal Engineers, as reported in our issue of January 11, which resulted in a stimulating and useful discussion.

It would have been impossible in a single paper to deal with the many designs of apparatus, and the author, while referring to some, dealt chiefly with the principles involved in the two great divisions of the subject, and set forth the advantages and disadvantages of working with and without the presence on each train of a visible authority to use the line.

Probably nothing was so strongly emphasised in the discussion as the fact that it would be a mistake to put the two ideas in opposition: it was entirely a question of the conditions to be met that should decide the selection of any particular form of equipment and method of using it. These conditions are not merely of an operating nature. Economic considerations play an important role, and however desirable a certain system may seem, there would in many cases be no real justification for adopting it, since all reasonable safety requirements could be met by something simpler and more easily maintained.

This point was stressed strongly in reports to the last International Railway Congress, to which Mr. McKillop referred, and even more in the discussions on them. Wherever token systems have been applied they have been accompanied by a remarkably high level of immunity from accident, while the simplicity of their controlling circuits, the absence of electrical track equipment between stations, and the ease with which intermediate sidings may be controlled under them, make a strong appeal. On the other hand, there are conditions in which a token system cannot be applied satisfactorily, as for example on the main lines in North America, with long lengths of single line over which fast trains are run and the crossing places frequently situated away from any habitation, where it would be difficult to keep staff.

Another consideration is on certain Continental lines carrying important through trains, and where every minute must be saved when they meet; a token system, although ordinarily applicable, is held to have disadvantages in that respect and some form of rapidly worked interlocked block is preferred, while the development of remotely controlled equipment seems likely to affect the picture in the future. All known methods of single-line working have their own special attractions and disadvantages, which vary according to local traffic requirements and operating conditions.

Freight Movement on British Railways

(By a Correspondent)

SINCE 1947 the twelfth four-week period to the beginning of December has produced the largest originating freight train traffic for any time of the year. No. 12 of *Transport Statistics* gives the tonnage for the four weeks to December 2 as 23,355,000, an increase of 183,000 tons (0·8 per cent.) on 1950. This was the highest four-week forwardings by British Railways, but fell far short of the Railway Executive expectations that in the average four-week period from October to April, 675,000 tons of additional traffic would be offered for conveyance. Instead of an estimated increase of 41,200 tons in merchandise, there was a decrease of 72,000 tons (1·6 per cent.), following upon a decrease of 74,000 tons in Period II. During the 48 weeks to December 2, merchandise tonnage increased by the trifling amount of 19,000 tons. The failure of the best-paying classes of traffic to expand confirms the official report to the Inland Transport Division of the Economic Commission for Europe that the increasing volume of the United Kingdom's industrial production tends to move by road and not by rail.

1. FREIGHT TRAIN TRAFFIC—FOUR-WEEK PERIOD TO DECEMBER 2

Region	Tons originated (000)	Increase or decrease per cent.	Ton-miles (millions)	Increase or decrease per cent.
London Midland	6,593	+0·5	669	+3·9
Western	4,054	+4·3	350	+1·6
Eastern	3,858	0·7	400	+5·0
North Eastern	5,250	+1·1	189	−2·1
Scottish	2,859	−3·2	198	−0·8
All Regions	23,355	+0·8	1,895	+3·6

Table 1 shows the distribution of tonnage and ton-mileage between the " heavy " Regions. The brunt of the extra tonnage fell upon the Western Region which forwarded 13,000 more wagons of coal, in contrast to the London Midland Region which despatched 18,000 fewer.

Table 2 sets out the statistics of freight movement in the same form as in the previous article published in our issue of January 4.

2. STATISTICS OF FREIGHT MOVEMENT—FOUR-WEEK PERIOD TO DECEMBER 2

Region	All Regions	London Midland	Western	Eastern	North Eastern	Scottish
Freight train miles (000)	11,544 (+1·3)	3,635 (−0·9)	2,084 (+1·9)	2,247 (+2·3)	1,194 (+0·4)	1,730 (+2·9)
Train engine-hrs. in traffic (000)	1,402 (−1·8)	520 (−5·2)	251 (+3·5)	269 (+0·3)	116 (−7·1)	172 (−0·1)
Ton-miles per train engine hour	1,115 (+5·1)	1,056 (+8·9)	1,099 (−1·7)	1,255 (+4·5)	1,412 (+9·8)	959 (−0·4)
Wagon miles per train engine hour	220 (+7)	206 (−10)	210 (−6)	242 (+6)	266 (+22)	209 (+2)
Freight train speed (m.p.h.)	8·23 (+0·25)	6·98 (+0·30)	8·30 (−0·13)	8·35 (+0·17)	10·29 (+0·76)	10·04 (+0·30)

The total increase in ton-miles of 66 million was due entirely to more movement of minerals and coal. The average length of haul for all traffic was 76 miles, compared with 74 miles in 1950. Train loads were lighter than in the previous period, but the average load of 164 tons for the whole system was four tons above 1950, the London Midland Region's load of 184 tons being eight tons higher and the Eastern Region load of 178 tons being up 4½ tons. The average wagon load at starting point for all Regions was 8·5 tons, the highest figure since February, 1951.

The results for the Eastern, North Eastern, and Scottish Regions were highly satisfactory. Above all the North Eastern figures for ton-miles and wagon-miles per train engine-hour were better than the other Regions recorded in June or July, which are usually the best periods for railway freight working. The North Eastern's area has plenty of elbow room and last year its freight train speed was less than 10 m.p.h. only in January and February and even in these difficult months its trains moved about 3 m.p.h. faster than the average speed in the London Midland Region.

The Eastern Region was a good second in output of freight train operation. It worked 50,853,000 more ton-miles than the Western Region—a difference of 14·5 per cent. The extra work was done in 18,000 more train engine hours than the Western Region recorded—a difference of only 7·1 per cent. The economical use of engine power is reflected in the last three items of Table 2, the betterment in the Eastern Region's figures being in marked contrast to the falling off in the Western's results.

The London Midland Region improved on its 1950 performance, but for the sixth time last year its freight train speed was below 7 m.p.h. That was a pity because the Region worked 34,000 fewer freight train miles, while the Western ran 38,000 more miles, the Eastern 51,000 more and the Scottish Region 49,000 more. Yet the rate of movement in the London Midland Region was nearly a mile and a third slower than in the Western. The margin of nearly 16 per cent. should be reduced during 1952.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Third Class Seats in Corridor Trains

January 21

SIR,—The criticism on armrests by your correspondent "Supervisor" in your January 11 issue, is fully justified. It is obvious that British Railways cannot afford to give third class passengers the luxury of only six seats to a compartment, and it is therefore surprising that these folding armrests should have been fitted in the new British Railways stock. They complicate the seat reservation scheme and cause a great deal of ill feeling between passengers and staff and between the passengers themselves.

What is required is a more even distribution of comfort between the corner and the inside seats. To this end I suggest the introduction of fixed centre arms and head rests in all third class corridor stock. This would provide eight definite seats per compartment and would afford all the occupants the opportunity of rest or sleep with some degree of comfort.

Yours faithfully,

P. M. BROOKE-HITCHING

2, Kensington Palace Gardens, London, W.8

Railway Carriage Design

January 5

SIR,—Interesting letters have appeared from time to time in your columns advocating the building of central open gangway stock instead of compartment stock with side closed corridors. One reason for this is "that the public would much prefer open stock of this kind even though it is against the tradition of this country."

The Midland Railway introduced nearly 80 years ago some all-car trains of this type, made up of Pullman Palace cars and of American cars of a similar kind built for the Midland. Such trains were introduced on June 1, 1874, between St. Pancras and Bradford (first, second and third class) and on April 1, 1875, between St. Pancras and Liverpool (first and second class), second class having been abolished on the Midland in January, 1875. No extra charge was made for travelling in the Midland cars.

The all-car trains were given a fair trial, but it was found that the public generally desired ordinary compartment stock. A final experiment was made in March, 1878, when for a short time an all-car train ran from St. Pancras to Liverpool and Manchester. The all-car trains were finally withdrawn, but for the benefit of those travellers who preferred the car to the compartment the Pullman Company took over the cars and distributed them among the compartment stock expresses in Great Britain.

The London Brighton & South Coast Railway put on an all-Pullman train between Victoria and Brighton on December 5, 1881; it met with a similar fate. The public pressed the company to add first class compartment stock to the train; this was done at the close of 1882, and some fifteen years elapsed before the all-Pullman formation was resumed.

The South Eastern Railway ran an all-car train between London and Hastings on December 1, 1896, and on October 1, 1897, another all-car train to Folkestone and Dover. Both conveyed first, second, and third class ordinary ticket holders. No more car trains were built, and the two withdrawn in the 1914 war were not reinstated.

The Great Western Railway Cork Boat train, put on in May, 1900, between Paddington and New Milford, consisted of carriages open throughout with central gangways and a kitchen car from which refreshments were brought to adjustable tables between the seats. It was not a structural success. MacDermot's "History of the Great Western Railway," Vol. II, page 478, says: "The open carriages did not however become as popular as those with the side corridor and only a few of them were built."

Is public opinion now against compartment stock? When a train is made up partly of side corridor compartment stock and partly of central gangway stock, does the public not choose the former? Sir William Acworth in "Railways of England" (1889) wrote: "We maintain in England our lonesome stuffy compartments simply because we like them." With this your editorial footnote to Mr. Parkes's letter published on December 28 last seems to agree.

Yours faithfully,

REGINALD B. FELLOWS

The Railway Club, 57, Fetter Lane, E.C.4

Ball and Roller Bearings

January 21

SIR,—I have read with the greatest interest the excellent article "Ball and Roller Bearings in Modern Rolling Stock," by Mr. Geo. W. McArd, which appeared in your January 11 issue.

I find it necessary to refer to Fig. 7—truck axlebox with roller bearings. This corresponds closely to the original roller bearing axlebox developed by London Transport for use on electric rolling stock bogies. London Transport practice, however, is to omit the felt pad let into the face of the thrust pad, as this is not required with grease lubrication. The thrust pad in current practice is faced with a low friction non-metallic disc, bearing on the end of the axle, to avoid the possibility of bronze worn from the original thrust pad getting into the rollers. The part of the seal on the axle is also made of non-metallic material in substitution for metal as shown, after an incident where a distorted axlebox caused a friction to develop between the two parts of the seal, resulting in a burnt-off axle stub.

I was somewhat surprised to find no reference to the very considerable development of roller bearing sleeves in substitution for motor suspension bearings, now practised by London Transport. The roller bearing sleeve, in conjunction with roller armature bearings, maintains const..t relationship between gear and pinion, permitting the ..e of a true lubrication grease in the gear-case instead of bitumen-bearing lubricants, and very much increasing the life of the gear and pinion and maintaining silent running.

Yours faithfully,

W. S. GRAFF-BAKER

55, Broadway, London, S.W.1

Rectifier Locomotives

January 7

SIR,—Regarding the article on rectifier locomotives by Mr. J. E. Bowler in your December 28 issue, I am afraid that the arrangement shown in Fig. 1 of motor voltage control on the transformer would not be satisfactory.

Although in general there is much to commend motor voltage control on the h.t. side of the transformer, considerable extra complications are introduced. The main transformer has to have at least 30 per cent. more iron and copper in its construction. For a large locomotive using direct single-phase motors control is probably best carried out on the h.t. side because the steps required for such a machine would be larger than the actual turns on the transformer secondary.

There has been a tendency to use a buck and boost transformer to reduce the number of transformer taps and contactors, but on balance the larger transformer is justified to obtain regulation on the h.t. side. This reasoning does not apply to motor coaches as the power to be handled is much less and a smaller number of controller steps usually suffices.

With regard to Mr. Bowler's remarks about reducing the number of poles causing among other things a reduction

in weight, I should again like to point out that it is only by *increasing* the number of poles can traction motor weights be brought down. With single-phase motors designers have been compelled to use a large number of poles to obtain satisfactory commutation and starting but this has caused the single-phase motor generally to be lighter than its d.c. counterpart.

It is not desirable to connect motors in permanent series as this arrangement causes the wheels to slip more readily.

Yours faithfully,

H. CHARNLEY

Brook House, Clayton-le-Woods, Lancs

Control of Capital Investment

January 14

SIR,—I read with interest in your January 11 issue Mr. Dow's letter attempting to justify the expenditure on station rebuilding on the North London Line.

It is difficult to see, however, why rebuilding of the two stations mentioned needs to be defended by mention of the heavy goods traffic on the line, as it is this very traffic which is often given as reason for a not too frequent passenger service. "Your Correspondent" quite obviously applied the term "moribund" only so far as passenger traffic is concerned.

While Mr. Dow's figures for originating traffic are impressive, I venture to suggest that some of his colleagues may well ponder on the fact that the North London is the only public transport crossing the borough of Hampstead. The introduction of a 1½d. single fare between stations within the borough might stimulate considerable additional traffic. For instance, shoppers bound for Kilburn (Brondesbury Station), cinema-goers for Hampstead Heath and Brondesbury Stations, and people who are visiting the hospital and town hall in Haverstock Hill would more readily take a train for 1½d. fare than take an arduous walk, as they do at present, rather than pay 3d. single fare for a few hundreds yards journey.

At Broad Street more traffic, I am sure, would originate if train departure times were advertised at the bottom of the stairs nearest Liverpool Street Station. Nobody likes to climb those endless stairs on the off-chance that a train may depart within a few minutes. As I have not been near Broad Street Station lately I cannot say whether this rather obvious measure has not already been taken.

Yours faithfully,

G. LEISER

Keeping Branch Lines Open

January 8

SIR,—The closing of portions of the railway system is generally a retrograde one, and there does not appear to be any finality to this policy. The road hauliers have the opportunity presented to them of applying for express road services to the detriment of main rail services, thus adding another problem to national transport.

One hundred years of railway industry is being frittered away in the illusory quest for road-rail co-ordination and economy, which is as far off as ever. If there is to be bias, surely it should be on the side of rail transport, especially in view of the slaughter on the roads.

Given the right leadership, coupled with simplicity of organisation and cutting of costs, rail transport can successfully challenge and reduce road haulage to its proper proportions. It then can give not only satisfactory service, but earn the gratitude of millions by promoting more safety on the roads, and proving that modern transport can be a blessing instead of a curse.

Yours faithfully,

ROBERT W. LEWIS

104, Leggatts Way, Watford

Publications Received

Le Monde Industriel. Paris 8e: 11, Rue Lincoln. 70 pp. Illustrated. Price fr. 350.—The November issue of this monthly review is devoted to the French National Railways. M. Louis Armand, General Manager of the S.N.C.F., contributes a chapter on the transport system of France, which is followed by chapters on each of the six S.N.C.F. Regions by its Regional Manager, and on various topics, such as the place of the railways in the French national economy, motive power, signalling, fluorescent lighting, and electric power production. The photographic illustrations and diagrams are well reproduced; some of the latter show traffic densities.

British Trains. Past and Present. By O. S. Nock. London: B. T. Batsford Limited, 15, North Audley Street, W.1. 8¼ in. × 5¼ in. 118 pp. Illustrated. Price 16s.—In an earlier book, published in 1947-48 and entitled "The Railways of Britain, Past and Present," Mr. Nock gave a broad account of railway development in this country; he has followed this with a similar type of book, which is specifically concerned with trains themselves. This later volume is a survey of the gradual development of locomotives and coaching stock, though, as the author points out, it has not been possible to go into minute dimensional details. Enthusiasm for the subject and much careful research, combined with Mr. Nock's characteristic style of writing, have produced an enjoyable book, which, though intended for the general reader, should also appeal to those with a more detailed knowledge of the subject.

Summer Holidays in the British Isles 1952.—Seaside and inland holiday resorts listed in the summer holiday programme of Thos. Cook & Sons Ltd. include the island of Sark, St. Mary's (Scilly), Portree in Skye, and Killarney, besides a host of others, large and small, to suit all tastes. There is a wide choice of inclusive motorcoach tours in Ireland and elsewhere and arrangements cover air travel when desired. A separate programme also describes coach tours.

Vulcan Foundry Limited: A Century of Trade with India.—In 1852 the Vulcan Foundry Limited built eight 2-4-0 passenger locomotives for the Great Indian Peninsula Railway, which were used to open the first public railway in India, from Bombay to Thana, in the next year. Since that order, nearly 2,750 Vulcan locomotives have been supplied for service in India: an average of more than one a fortnight for 100 years. In connection with this centenary, the Vulcan Foundry has issued a booklet setting out a brief history of the company, with a short description of the works and the apprenticeship scheme. The booklet is fully illustrated and a selection of locomotives built for India by the Vulcan Foundry is included. Although the booklet has been prepared for distribution in India, much of the information given applies equally to Pakistan, as before Partition the company supplied numbers of locomotives to the railways now within that country.

Central Railway Magazine: Souvenir Number, November, 1951. Bombay: General Manager's Office, Victoria Terminus. Price one rupee.—This issue commemorates the inauguration on November 5 of the Central and Western Railways of India, the subject of an article in *The Railway Gazette* of November 9, 1951. Messages of congratulation are reproduced from the President of India, Dr. Rajendra Prasad; the Prime Minister, Mr. Jawaharlal Nehru; H.E.H. the Nizam of Hyderabad; the Minister for Transport & Railways, Mr. Gopalaswami Ayyangar; the Minister of State (Transport & Railways), Mr. K. Santhanam; the General Manager of the Central Railway, Mr. H. P. Hira; and others. Accounts are given of the ceremonies in connection with the inauguration of the two new railways as well as of the opening in 1853 of the Great Indian Peninsula Railway, the first railway in India and the largest constituent of the Central Railway. A historical review of the Central Railway traces the development of its four components: the G.I.P., the Nizam's State, the Scindia State, and the Dholpur State Railways. There are also articles on aspects and activities of the G.I.P.R., some interesting photographic illustrations, and a coloured pictorial map of the Central Railway showing the new divisional organisation.

THE SCRAP HEAP

Icicle Hit by Train in Tunnel

A train from Middlesbrough to Whitby struck an icicle 8 ft. long and 1 ft. thick in Grinkle Tunnel, near Loftus, during the cold spell earlier this week. The cab window was smashed, cutting the driver and fireman.—*From the "Daily Mail."*

The First Cowcatcher

A correspondent writes that the cowcatcher still in common use on the American and other railways was also used in Great Britain and Ireland long ago when the permanent way was not well fenced. Isaac Dripps, the master mechanic of the Camden & Amboy Railway, was the pioneer of this invention. In 1831 the device was applied to the locomotive *John Bull*, built by Stephenson, and has been so depicted in old prints and drawings of that locomotive.

In 1844 a train of the Ulster Railway from Lurgan to Belfast killed six cattle near Moira, Co. Down. The engineer recommended that a cowcatcher should be fixed on all the company's engines in the future until "the line be better fenced." We have ample historical records to establish that the appliance was fitted on different Irish locomotives including those of the Cavan & Leitrim Railway.

American Railroad Centenary

Last year, the Illinois Central Railroad, one of the ten largest railways in the U.S.A., celebrated its centenary, and the story of this "Main Line of Mid-America" has been told in a handsome volume of 470 pages, written by Mr. Carlton J. Corliss, which we reviewed in an editorial article in our issue of February 2, 1951.

Recently the President of the railway, Mr. Wayne A. Johnston, has distributed a card, one of which addressed to *The Railway Gazette* is reproduced below, expressing appreciation of the interest and goodwill shown on the occasion of the Illinois Central Railroad centenary, and pledging continuance of service and further progress in the years to come.

German Train-Naming Competition

Until now, only one German train has a name, the "Rheingold Express" from the Hook of Holland to Basle. The German Federal Railways decided to give names to 19 other trains, and launched in a paper a competition inviting the public to propose suitable names. The winners in this competition will receive prizes amounting to a total value of DM. 30,000.

To attract the attention of the public and to interest it in this effort, the German Federal Railways placed a large question mark on the tenders of some express engines. Later, the interest of the public having been aroused, the question mark was explained by substituting for it the inscription "Trains Look for a Name." So far, 20,000 suggested names have been submitted, many of them having come from abroad.

Rise and Fall of Whitmore

The announcement that the London Midland Region is to close Whitmore Station on February 4 recalls that, although only three local passenger trains in each direction call there today, there was a time when all trains between London and the North West stopped at Whitmore. This was one of the original stations on the Grand Junction Railway, which was opened in 1837, and although its population was only 281, it ranked with Wolverhampton, Stafford, Crewe, Hartford, and Warrington as a "first class station."

The secret of the importance of Whitmore lay in the fact that it was the point at which the horse-drawn road buses serving the Potteries, Shrewsbury, and Market Drayton connected with the railway. The Grand Junction, the London & Birmingham, and Manchester & Birmingham railways combined in 1846 to form the L.N.W.R., and as new lines were opened and Shrewsbury and the Potteries were reached by railways, the importance of Whitmore declined.

Preview of Sponsored Advertising:

"And so to France . . ."

(For two crooners and Pullman Wagon-Lits chorus)

Rob:
The diplomat, the elegant,
The connoisseur, the dilettante,
The earnest amateurs of art
Who throng the Boul' Miche and Montmartre,
The hierarchs of wine and food,
The gastronomes who know what's good,
The hardy types who get their fun
From winter-sporting in the sun . . .

Roy:
The dames who find their heaven on earth
Chez Dior, Paquin, Fath, or Worth.
The sun-starved souls who may be found
In "Blue Trains," Riviera-bound,
The other folk, like me, like you,
Who just have jobs of work to do,
But wend our willing way to France
As often as we get the chance . . .

Chorus:
Whate'er their business or pursuits,
All travel by the SHORT SEA ROUTES.

Rob:
I'm glad the Dover Straits are narrow,
That's why I go by "Golden Arrow" . . .

Roy:
And I'm so happy in *my* work
I take the "sleeper" to Dunkerque . . .

All:
On this one point we all agree,
With touching unanimity,
That, when we visit *la belle France*,
Whate'er our state or circumstance,
We like reliability,
Economy, stability . . .

Rob and Roy:
With services by day or night,
One of them's bound to be just right . . .

All:
And we maintain with zeal and zest
That British Railways boats are best!

—By courtesy of Auntie Nausea's Tablets.

ILLINOIS CENTRAL RAILROAD
IN Appreciation
OF THE PARTICIPATION AND GOOD WILL OF
in the celebration during 1951 of the 100th anniversary of the Illinois Central Railroad as the Main Line of Mid-America, this expression of gratitude is presented.
This railroad, on the foundation of progress and partnership achieved in its first 100 years, reaffirms its pledge to live throughout its second century as good neighbor to Mid-America.
PRESIDENT
100 YEARS
ILLINOIS CENTRAL
MAIN LINE OF MID-AMERICA

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

INDIA

Committee on Coal Economy

The Ministry of Railways has set up a committee to investigate the supply, distribution, reserve stocks, and consumption of coal by the railways, and to recommend economies in its expenditure.

VICTORIA

New Suburban Rolling Stock

New suburban electric trains are to be built for the Melbourne suburban area. The Railway Commissioners announced on January 17 that 210 cars of the improved type and new layout (illustrated in our December 1, 1950, issue) would be built and formed into 30 seven-car trains. A large number of compartment stock trains, some built 60 years ago, will be scrapped. These are in poor condition, rough riding and shaky, and their electrical equipment is giving constant trouble.

There are 889 electric passenger cars on the Melbourne suburban system; about 270 are 40 years old. The old compartment stock trains operate from Flinders Street to St. Kilda (four six-car trains); to Port Melbourne (two six-car trains); on the Eastern Suburban Railway through Richmond, Camberwell, Box Hill, Ringwood to Fern Tree Gully and Lilydale branches; and from the Princes Bridge island platform, which adjoins Flinders Street Station, to Reservoir, Heidelberg, and beyond. Compartment stock is found on the shuttle services of the Kew, Alamein, Glen Waverley, and Altoona branches.

Saloon-type sliding door (nine doors to the coach) stock, some converted from steam stock after 1919, is worked over all other routes: Dandenong, Frankston, Sandringham, East Malvern, Williamstown, St. Albans, Broadmeadows, and Fawkner lines. Some of the suburban vehicles are almost as old as the lines over which they work. The Eastern Suburban line from Hawthorn-Lilydale was opened in 1882, the Heidelberg line in 1888, and the Reservoir line in 1889.

The new rolling stock interior follows slightly the trend of London Transport and British Railways Ilford line stock. It will not appear for two or three years, as tenders have not yet been invited.

Modernisation of substation equipment is in hand; one was recently completed at Box Hill, and another at Alpington, near Heidelberg, is nearly completed. Mercury-arc rectifier substations are to be installed on the Caulfield-Dandenong-Frankston lines. These substations will operate from a 50-cycle power supply taken at Caulfield from the State Electricity Commission network, and will form the first stage of a changeover of all substations in the suburban area from 25 to 50-cycle supply.

MEXICO

Dieselisation in Monterrey Area

The National Railways expect shortly to replace all steam locomotives in the Monterrey area by diesel units on order in the United States. The steam locomotives will be scrapped.

New Lines

Construction of the Durango-Mazatlán line is to be accelerated this year by an investment of 62,000,000 pesos (about $7,175,880) which has been appropriated by the Department of Communications for the purpose. Last year only 8,000,000 pesos (about $925,620) had been invested for preliminary construction work. Work will be concentrated on construction of the mountainous section where considerable blasting will be necessary.

The line is essential to the economy of the region. It will permit movement of farm and industrial products from central States to the Pacific coast for export.

The Government is also surveying the needs of the recently acquired Southern Pacific Railway, serving the states of Nayarit, Sonora, Sinaloa and parts of Jalisco. It is planned to connect the Durango-Mazatlán and the Southern Pacific near Mazatlán in the State of Sinaloa.

Operation of Southern Pacific

The recently-acquired Southern Pacific Railway of Mexico will be operated independently of the National Railways, and by its own staff. This decision has been taken not to impede the rehabilitation programme of the Government which is almost completed. Improvement of the Southern Pacific of Mexico will need new appropriations to finance the laying of 2,000 km. of heavy-type rail, the purchase of new locomotives, coaches, and wagons, and improvements to yards and stations.

Diesel Maintenance

The management has ordered the enlargement and modernisation of diesel repair shops which are not at present adequate properly to repair and service diesel locomotives. Fully-equipped repair yards are planned so that it will not be necessary to send diesels to the United States for overhauling and repairs. Diesel locomotives have had to be returned to the U.S.A. for even minor repairs, but it is hoped that in future they need be sent only when major repair is required. Diesel repair yards will be situated in San Luis Potosi.

Accelerations Promised

Acceleration of services this year has been promised. Modernised rolling stock and the laying of heavy rail will allow faster running on the 1,223-km. journey to Laredo, now covered in 14 hr. The present running speeds on main lines are 45-50 km.p.h. and on secondary lines, 25-30 km.p.h.

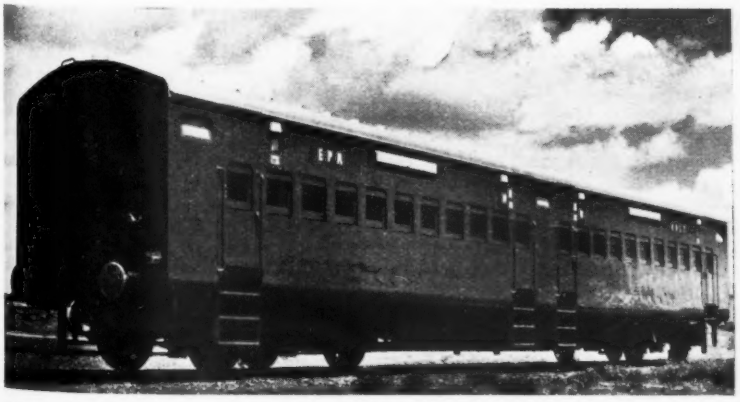
SPAIN

Interchangeable Axle Wagons

The difficulties caused by the difference in gauge which have beset traffic with other European countries have now been almost completely overcome by the use of interchangeable axle wagons.

The Société d'Etudes et d'Exploitation Matériel Auxiliaire du Transport (Semat), financed and largely controlled

Modern Indian Rolling Stock



All-metal third class coach, built by Hindustan Aircraft Limited and running on the Eastern Punjab Railway (see paragraph in January 4 issue)

by the Spanish National Railways, has been studying all aspects of the problem, which, although not new in theory, had never been seriously tackled, with the exception of a few small experiments in 1920 by the Duboc Society.

Semat-Transfesa Agreement

By an agreement between Semat and Transfesa (Transports Ferroviaires Spéciaux), Transfesa will undertake the operation of the combined rolling stock of both companies, and Semat will deal with all the technical problems involved. Semat has built 30 interchangeable axle wagons provided with the types of brakes used by the countries through which the wagons run. These wagons have proved satisfactory and have yielded valuable data for the construction of other wagons now being built. The joint rolling stock is 65 wagons, —40 Continental loading gauge and 25 British loading gauge. It is hoped soon to provide a further 37 British gauge refrigerated type wagons.

The project provides ultimately for 500 interchangeable axle wagons, owned by Semat and Transfesa, including tank wagons with a loading capacity of 20 tons each, ventilated wagons chiefly for the transport of fruit for which refrigeration is not required, and refrigerator wagons for conveyance of fruit requiring a lower temperature, and if necessary capable of conveying also fruit requiring ventilation instead of refrigeration.

Tremp-Pobla de Segur Line

On November 13 the Minister of Public Works opened the Tremp-Pobla de Segur section of the Lerida-San Girons line.

Kilometric Tickets

The National Railways have drawn up a tariff for kilometric tickets or carnets, sold only outside Spain and allowing the holder to use *rapide* trains and Pullmans without payment of supplements. The tickets or carnets are issued in first, second, and third classes. They consist of coupons each valid for a journey of 5 km. which, at the beginning of the journey, are cut to the number necessary to cover the distance required. This convenient system allows the user to vary his itinerary.

The validity of the ticket can be extended for one day per 100 km. or fraction thereof on payment of 10 per cent. of the value of the unused coupons. The holder may change the class of travel *en route*, if desired, on payment of the difference in the fare prescribed in the general tariff.

ARGENTINA

Second Five-Year Plan

Among suggestions received by the Government for inclusion in the second Five-Year Plan shortly to be begun are the completion of the Southern Transandine Railway between Bahía Blanca and Talcahuano, and the extension of the recently-acquired Buenos Aires Provincial Railway to Plaza Constitucíon by means of mixed gauge between that terminus, and a new junction between the two systems at Sarandí.

End of B.A. Transport Corporation

By a decree of the Argentine Government, the Buenos Aires Transport Corporation ceased to exist on January 1. Its services have been transferred to a new section of the Ministry of Transport known as Transportes de Buenos Aires.

Trial of New Diesel

The new Argentine-built diesel-electric locomotive *Justicialista* made a trial run between Buenos Aires and Mendoza on January 17, covering the 1,063 km. in 11 hr. 40 min., an overall speed of 91 km.p.h.

FRANCE

S.N.C.F. Finances

In 1952, the S.N.C.F. will be permitted to spend fr. 45,820 million on new capital works, and fr. 9,400 million on the completion of works already in hand. Of the first-mentioned figure, fr. 31,170 million will be spent on reconstruction and rehabilitation, and fr. 14,650 million on new capital assets. Of the total expected outlay during the year of fr. 55,200 million, fr. 26,000 million will be raised by State loans, fr. 3,700 million will come out of revenue, and fr. 25,500 million by an issue of stock guaranteed by the State.

Rhone Floods

Considerable interruption was caused to services in late November by floods in the Rhône Valley. On November 20, both tracks of the Paris-Marseilles line were covered for a distance of 1,421 yd. between Bollène and Mondragon by the rising of the Lez, a tributary of the Rhône. The embankment was washed away for approximately 109 yd., to a depth of some 9 yd., and for this distance the track was left suspended in the air. Traffic was diverted *via* the right bank of the Rhône in one direction and *via* Avignon in the other. Running was restored in one direction by the evening of November 22, and in the other direction by the afternoon of November 24.

Record Traffic in 1951

Traffic on the S.N.C.F. in 1951 beat all records. It amounted to 73,000 million km. units, compared with 65,300 million in 1950, surpassing by 3,000 million the traffic in 1929, the best pre-war year. The increase on 1950 was 15·7 per cent. for freight and 6·8 per cent. for passenger traffic. The number of wagons loaded was 14,751,643, 9·4 per cent. more than in 1950.

Total receipts amounted to fr. 331,330 million (fr. 261,400 million), an increase of 26·7 per cent. Surplus receipts were fr. 62,300 million for freight, fr. 6,300 million for passenger traffic, and fr. 1,300 million for parcels and luggage. These results were achieved despite the reduction in staff from 442,800 in January, 1951, to about 420,000 at the end of the year.

SWITZERLAND

Damage from Avalanches

The large number of avalanches during the winter of 1950-51 caused exceptionally heavy damage to a number of private lines, notably the Rhaetian Railways and the Furka-Oberalp Railway. The Federal Council decided to assist the railways to make good the damage caused by avalanches by allocating a maximum of fr. 1,000,000 (about £83,350) to the Rhaetian Railways and fr. 325,000 (about £27,000) to the Furka-Oberalp Railway.

IRELAND

Estimated C.I.E. Loss

The estimated loss by C.I.E. for the year ending on March 31, 1952, was £1,640,000, and, if the fares and charges had not been increased last September, the loss would be over £2,000,000, according to Mr. M. J. Hayes, the company's staff relations officer, at the Labour Court in Dublin recently.

The Court was investigating a dispute between the company and the Irish Transport & General Workers' Union and the National Union of Railwaymen over claims for increased wages for members of the union employed in the traffic grades of the road passenger section.

Transport Museum

A site has been acquired near the G.N.R.(I.) Sutton tram terminus for the erection of an Irish Transport Museum. The site has been bought from the G.N.R.(I.) by the Dublin Tramways Preservation Committee of the Transport & Science Museum Society.

The Society's possessions include the famous Inchicore-built "Balcony Bogie No. 328," which was to be scrapped in 1942, but will now be preserved at Sutton. Other exhibits will be "Standard Car No. 129" and "Luxury No. 132." When these have been removed to Sutton they will be restored to their original appearance.

Improvements at Claremorris

C.I.E. is spending £8,000 on improving Claremorris Station, the centre for pilgrim traffic to the nearby Knock shrine. Two additional platforms are under construction, and footbridges, sidings and entrances are being extended and rebuilt. The down main line and Ballinrobe branch platforms are being converted into island platforms.

The largest pilgrimage to Knock was that in which 10,000 employees of C.I.E. recently took part.

Cheaper Single Railway Fares

Some considerations involved in the exercise of the public choice

(*From a Correspondent*)

THE absence, from the B.T.C. Passenger Charges Scheme as submitted to the Transport Tribunal of any proposal to reduce single fares by rail caused disappointment to those who advocated such a course on the ground that it would stimulate travel. The case against any reduction is well known; its legal and financial basis makes it difficult to counter with the more general arguments which alone are available to those who would like to see a reduction. Nevertheless, the importance which is widely attached to these general arguments may justify some further consideration. (The conclusions of the Tribunal were summarised in *The Railway Gazette* of January 25.)

The B.T.C. *Transport Statistics* provide some useful figures for such an examination..

BRITISH RAILWAYS
PASSENGER JOURNEYS ORIGINATING 000's

—	1947	1948	1949	1950	1951
January	5,869	5,507	4,830	4,057	5,704
February	4,739	4,785	3,785	3,403	4,852
March	6,157	6,173	4,564	4,059	6,164
April...	6,479	5,480	5,149	4,328	5,673
May	7,113	6 184	4,609	4,399	6,457
June	6,760	5,501	4,956	4,207	6,489
July	7,670	6,475	5,477	4,956	6,987
August	8,072	6,700	5,586	5,153	7,643
September	6,822	5,804	4,920	4,880	6,972
October	5,668	5,107	4,464	5,814	—
November	5,164	4,716	3,799	5,314	—
December	5,985	4,992	4,273	6,137	—

BRITISH RAILWAYS
ORDINARY FARES: AVERAGE RECEIPT PER JOURNEY IN PENCE

—	1947	1948	1949	1950	1951
January	39·65	42·44	44·84	48·64	34·77
February	40·22	42·60	45·72	44·28	34·90
March	39·31	47·96	47·80	48·01	36·98
April	45·56	52·29	55·00	56·33	40·09
May	46·44	53·82	59·16	57·45	41·14
June	52·70	65·11	65·27	67·84	46·79
July	64·45	74·78	80·05	77·81	57·14
August	62·71	70·48	77·45	80·07	55·99
September	59·84	69·54	77·90	74·47	51·16
October	54·54	53·46	56·34	42·72	—
November	43·20	45·18	47·05	35·09	—
December	44·96	50·02	49·18	35·84	—

With the fares increase in October, 1947, the ordinary fare per mile became about 2·44d. The average distances represented by the average receipts per journey therefore range from 17⅜ miles in November, 1947, to 32¼ miles in July, 1949. From June to September in 1948, 1949, and 1950 the average distance appears to be about 30 miles; for the rest of the year it is probably about 20 miles. Allowing for a proportion of longer journeys, which would be greater in the summer months, it is a fair deduction that the great majority of journeys at ordinary fares throughout the year are over distances of not more than 15 to 18 miles.

The case for a cheaper single fare is usually based on these short journeys. It is contended that, apart from a small and diminishing hard core of passengers who prefer rail at all costs, most people only make such journeys at the ordinary fare because the cheaper alternative by road is not available at the time required. They feel that the railways have taken advantage of them, and acquire a lasting prejudice against rail travel. They do not come back for more, and so a high proportion of travel at ordinary fares consists of a constant succession of new "one occasion only" passengers. It follows that ordinary fares engender a continually increasing volume of public antagonism towards the railways, which is reflected in decreased receipts from other types of bookings.

If this were true, one would expect to find ordinary travel responsive only to general fluctuations in public spending power, and not to variations in rail fares and in their relation to road fares. The figures in the above tables do not entirely confirm this. They appear to show that the 1947 increase in rail fares did in fact cause during the three following years a simultaneous decrease in ordinary journeys and increase in average receipts per journey, indicating that the decrease was in the shorter journeys. The reversal of this trend at the end of 1950 and in 1951, when road fares began to increase, suggests that the whole picture is one of a swing away from rail and back again caused by the changing relation between road and rail fares. Such swings are caused by the public exercising its choice, and to the extent to which passengers at ordinary fares are shown to exercise choice, they cannot be "one occasion only" passengers in the sense suggested, the essence of whose position is that at the material time they have no choice.

Only limited comfort can be derived from this argument, because it implies that before October, 1947, passengers must have paid ordinary rail fares for short distances only to save themselves much inconvenience. In 1948, 1949, and 1950 they must have preferred the inconvenience to the higher rail fare. More recently, they have found the saving by road once more insufficient to justify the inconvenience. They must feel that they are buying convenience as well as rail travel, and they can hardly like it.

Nor does the argument exclude the possibility of a proportion of disgruntled "one occasion only" passengers who undoubtedly exist in considerable numbers. Desirable as it may be to earn the goodwill of both these classes, a commercial case for lower single fares would require a financial basis as well.

Experimental Fares

There would be no need to abolish the present ordinary fares. Requirements would be met by experimental single fares distinguished from ordinary singles by being available only for journeys commencing on the day of issue and without break of journey. Experimental single fares are no new invention. The level of the fare would have to be not more than half the cheap day return fare, or less than half the summer return. At this level it would be less than half the monthly return fare, and so could be applied only between those points where summer or cheap day fares have already practically ousted monthly returns—unless, of course, there were any instances in which a case might be made out for experimental single fares where it had not been possible to make one for summer returns. In other words, it is most unlikely that experimental singles could be justified except where summer or cheap day fares are justified. This limits the field to distances up to about 30 miles; as we have seen, the great bulk of travel at ordinary fares is in fact at these distances.

As both summer and cheap day returns are in force between some points, an experimental single fare would have to be high enough to protect both. Half the cheap day return fare would give a fare of about 1¼d. a mile; two singles at this rate would cost about 25 per cent. more than a summer return

for the same distance, a differential which is reasonable and gives adequate protection. As the cheap day return fare is the same as the ordinary single, what is required is an experimental single fare at half the ordinary single rate, available by any train on the day of issue only, and without break of journey.

What would be lost or gained by such a fare? There would be a loss on :—

(i) Traffic now passing at full ordinary single fares.

(ii) The residue of traffic at monthly return fares.

(iii) Those summertime returns which in some cases are bought because they are cheaper than ordinary singles.

(iv) Summer or cheap day returns in cases where passengers who have hitherto travelled both ways by train would now go one way by bus.

To offset these losses, gains might be expected from :—

(*a*) An increase in the number of passengers at single fares.

(*b*) Some influx of passengers who have hitherto travelled both ways by bus, and would now go one way by train.

(*c*) A general increase in interest in local train services, arising from the knowledge that rail, when convenient, will not be unreasonably dear for short journeys.

The balance sheet would have to include the effect on operating costs. For instance, at pleasure resorts in the summer there would be the problem of unbalanced working. Passengers go to the resorts by bus throughout the day, but all wish to return at the same time; to avoid waiting, many already return by rail, and many more would do so if the single rail fare were reduced.

This problem of unbalance working is only an extreme instance of the general situation which would be created in the relation between local road and rail services. It might be regarded as an obstacle to the introduction of experimental single fares; it would perhaps be better welcomed as an impulse towards acceleration of the process of co-ordination of local services.

One would like to see an experiment carried out with the reduced single fares on one or two branches with parallel road services, under conditions of careful statistical control. Among the branches chosen should be at least one without summer or cheap day tickets, to provide the limiting case. There seems to be no other way of settling a question in which the straight financial case is more than usually at odds with public opinion.

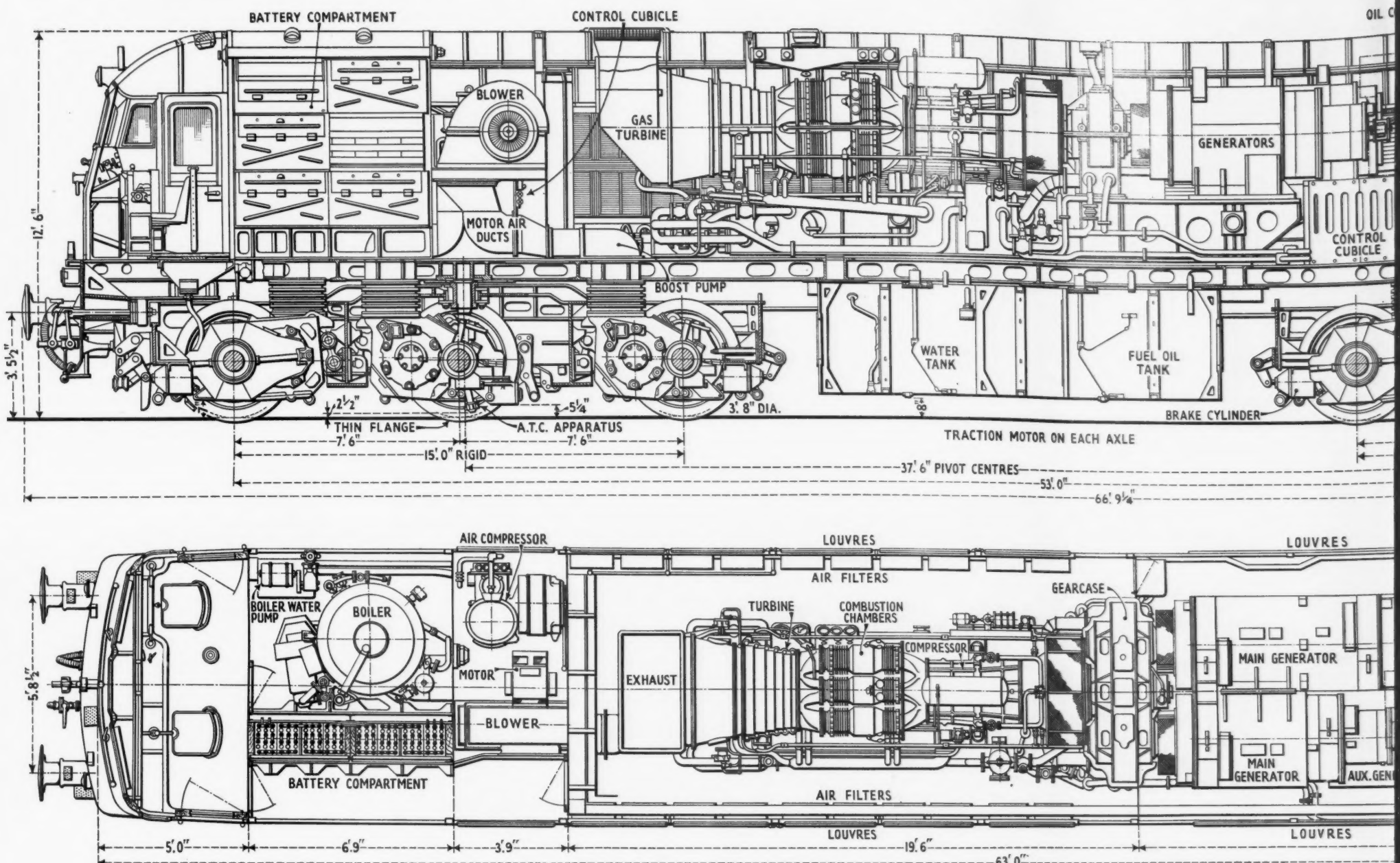
RUSSIAN TRAIN SPEEDS.—The Swiss Journal *Die Weltwoche* has recently commented on the slowness of trains in the Soviet Union. Although travel by passenger train throughout the world takes considerably less time today than formerly, it says, and in Europe journey times often have been halved in the past 40 years, it takes longer today to travel from one town to another in Russia than in 1913. This fact has been established by two experts of the Stockholm School of Commerce, in a report on Russian timetables in *Industria*. The following journey times are given: Moscow - Leningrad, about 10 hr. in 1913, today 13 hr. 30 min.; Moscow - Riga, 22 hr. 40 min. (25 hr. 30 min.); Moscow - Kiev, 21 hr. (28 hr. 30 min.); Moscow - Baku, 57 hr. 57 min. (71 hr.); and Moscow - Kazan, 24 hr. (30 hr.). Thus the average overall speed of express trains has been reduced to 25 m.p.h.

F.B.I. REPRESENTATIONS ON THE BUDGET.—The Federation of British Industries, in submitting its views earlier this week to the Government on taxation problems in relation to the forthcoming Budget, expressed the hope that the Chancellor of the Exchequer would not allow the exigencies of the immediate situation to mask the long-term needs of British industry. The Federation stated that by the end of 1949, postwar capital expenditure had hardly done more than make good the deficiencies of the war period and that there was less real capital for each worker than in pre-war days. The excessive weight of taxation on British industry over several decades was beginning to have its effect on its competitive power. There must be, it was stated, a really drastic cut in Government expenditure accompanied, as soon as possible, by a reduction in the general burden of taxation. Without such action British industry would be faced with increasing difficulty in finding adequate capital resources and in maintaining productivity. The profits tax, the Federation maintained, was bad in principle and full of anomalies and if it was not abolished altogether, action should be taken at least to remove the worst anomalies. If the proposed excess profits tax took a form similar to the E.P.T. of the two world wars, it would discourage enterprise. It would encourage extravagance and would not encourage further production of raw materials which were essential both for rearmament and increased productivity. If the tax were imposed, the F.B.I. hoped that allowance would be made in respect of increases in capital and corresponding adjustment made for a reduction in the capital employed. Profits from overseas enterprise should be exempted altogether. In a reference to the Royal Commission now deliberating on the whole field of the taxation of income and profits, the Federation drew a distinction between business profits and the majority of other kinds of income. Because of price increases, allowances for stock replacement and for depreciation did not provide the funds necessary to maintain physical capital, and under the present law the whole surplus after maintaining money capital, as distinct from physical capital, was treated as profit.

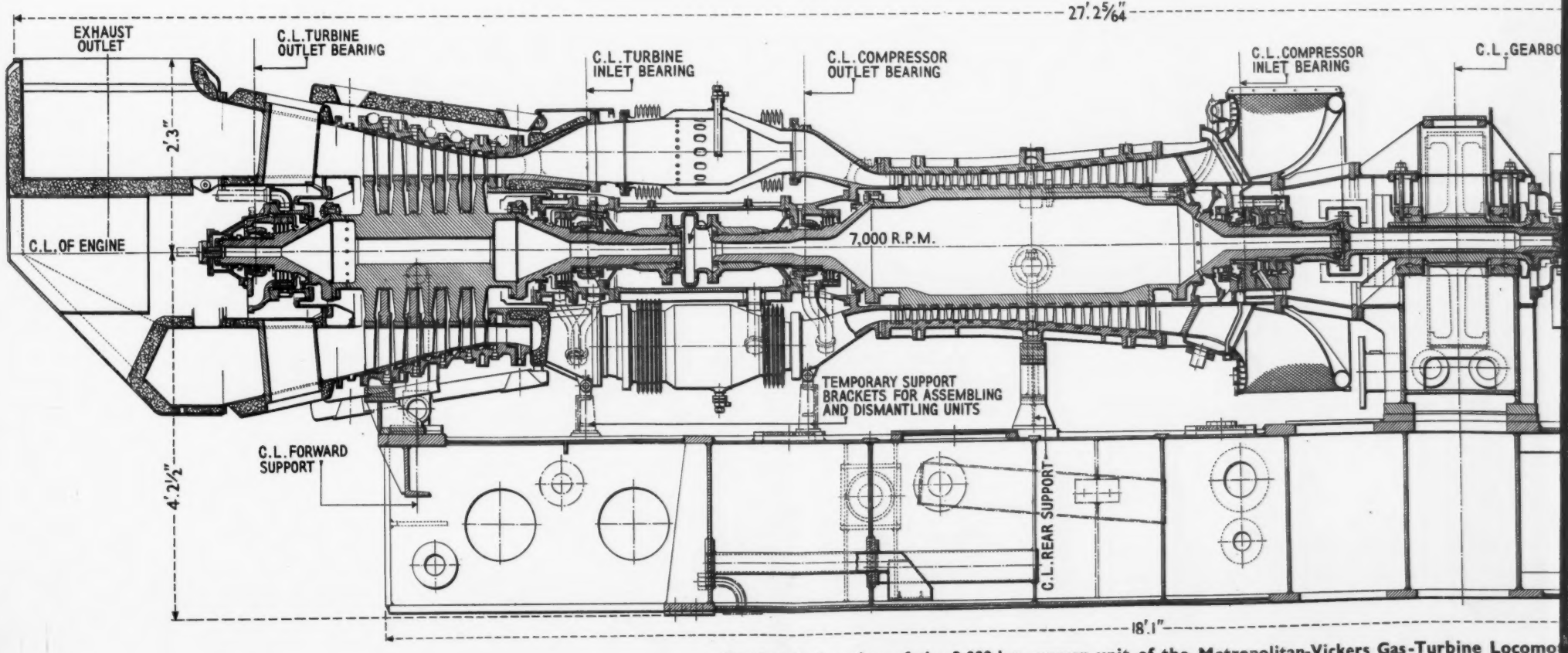
INQUIRY INTO TRANSPORT ACT.—The London Passengers' Association, in a recent statement on the findings of the Transport Tribunal regarding the application by the British Transport Commission to raise passenger fares, urged an inquiry by a royal commission into the effect of the Transport Act, 1947, on the fare-paying public. The Association said that the schedules attached to the findings in almost every case were exactly the same as the original application. "No amelioration whatever has taken place," it added. "In one or two instances there have been slight alterations upwards. . . . It is an amazing climax to find that in no single instance, at any rate in regard to the published schedules, has their intervention been of the slightest use."

DOLLARS FROM TOURISTS.—The tourist trade maintained its position as the largest individual dollar-earning export last year. American and Canadian visitors to Britain numbered 170,000 and earnings from North American traffic amounted to $100 million. Sir Alexander Maxwell, Chairman of the British Travel & Holidays Association, announced these figures at a meeting in London recently, when he also added a warning that the tourist trade could not continue to produce dollars and other needed currency without further capital investment to increase first-class hotel accommodation. He said that tourist earnings, including fare payments to British carriers, had risen from an estimated level of rather more than £40 million in 1938 to more than £104 million in 1951. The number of visitors had increased during the same period from 450,000 to 700,000 and the inclusion of visitors from the Irish Republic brought the 1951 total to 850,000. Last year visitors included 148,000 from the Dominions and Commonwealth and 386,000 from the Continent. The earnings from the North American traffic had increased by more than 10 per cent. over 1950. Other points raised by Sir Alexander Maxwell were: Nearly half the number of American visitors travel here by air; there have been many compliments about British boat trains, sleeper facilities, and tourist expresses; visitors to the Festival of Britain were surprised at the wealth of attractions that the country provided.

LEOPOLDINA TERMINAL SCHEME OF ARRANGEMENT.—The Leopoldina Terminal Co. Ltd. has now submitted a scheme of arrangement to its debenture stockholders for the purpose of approving the scale of its Brazilian interests and for dividing the proceeds thereof. In September last year a conditional agreement was entered into with a Brazilian group for the sale of the holding of 147,769 (out of 150,000) shares in the Companhia Cantareira e Viacao Fluminense for an aggregate price of Cr.29,553,800. Under the present scheme it is intended to apply this amount first in providing for various liabilities, expenses, and so on, estimated to require £17,000, and then in repaying the balance of the debenture capital of £1 per cent., requiring a further £8,938. The next £156,250 is to be applied as to 80 per cent. towards payment of the arrears of interest accruing up to July 1, 1952, and as to 20 per cent. by way of distribution among the ordinary stockholders. This apportionment would represent a payment of £13 19s. 8d. per £100 debenture and a payment of 6d. per £1 of ordinary stock. The scheme further provides that any balance of the total proceeds shall be applied first to covering any additional expenses and next for an amount not exceeding £335,307 to be applied in further and full satisfaction of arrears of debenture interest with any balance remaining for distribution among the ordinary stockholders. If the sum of £335,307 is realised this would represent a payment of £37 10s. 4d. per £100 debenture.

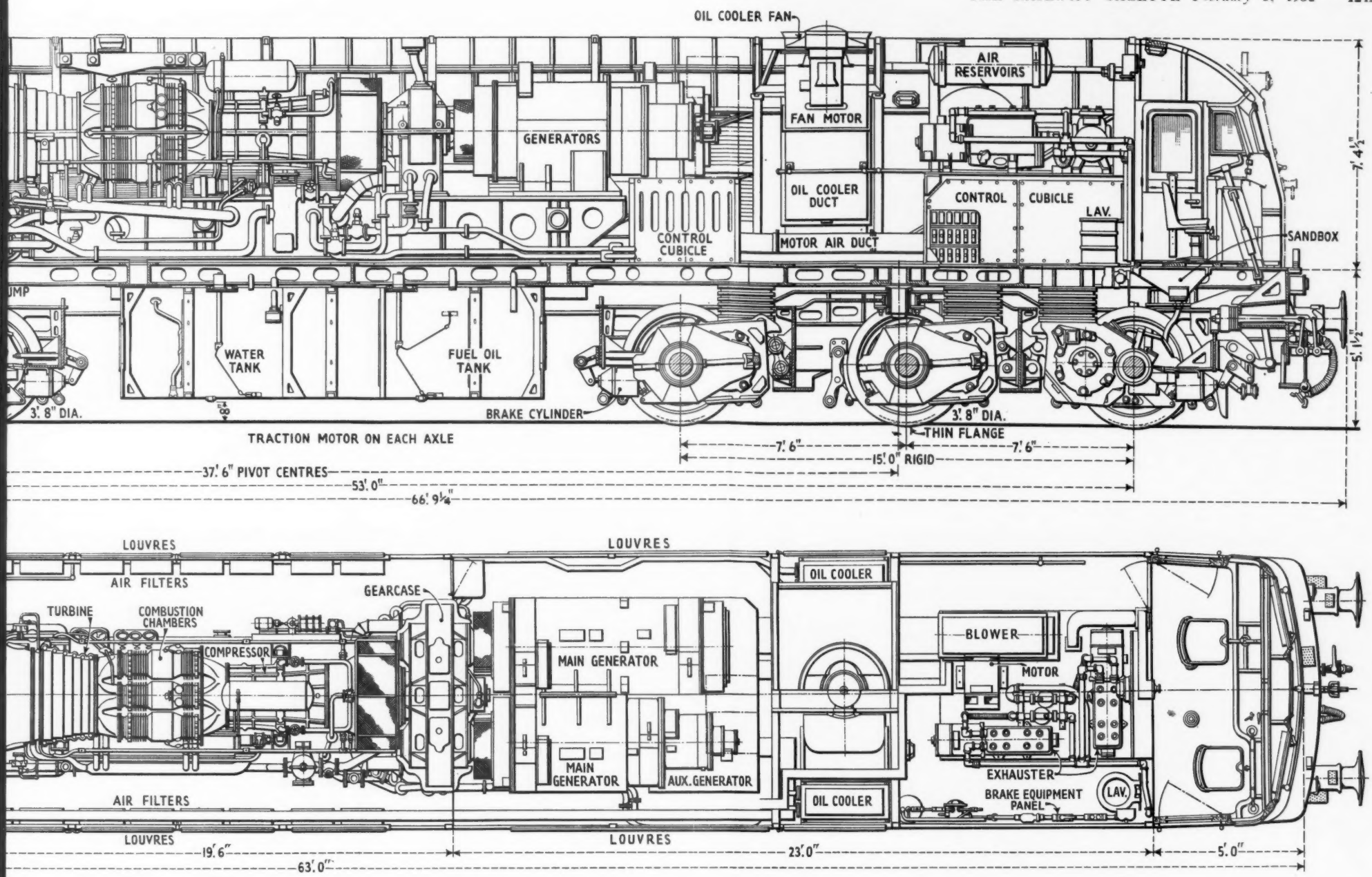


Sectional elevation and plan showing the layout of the equipment

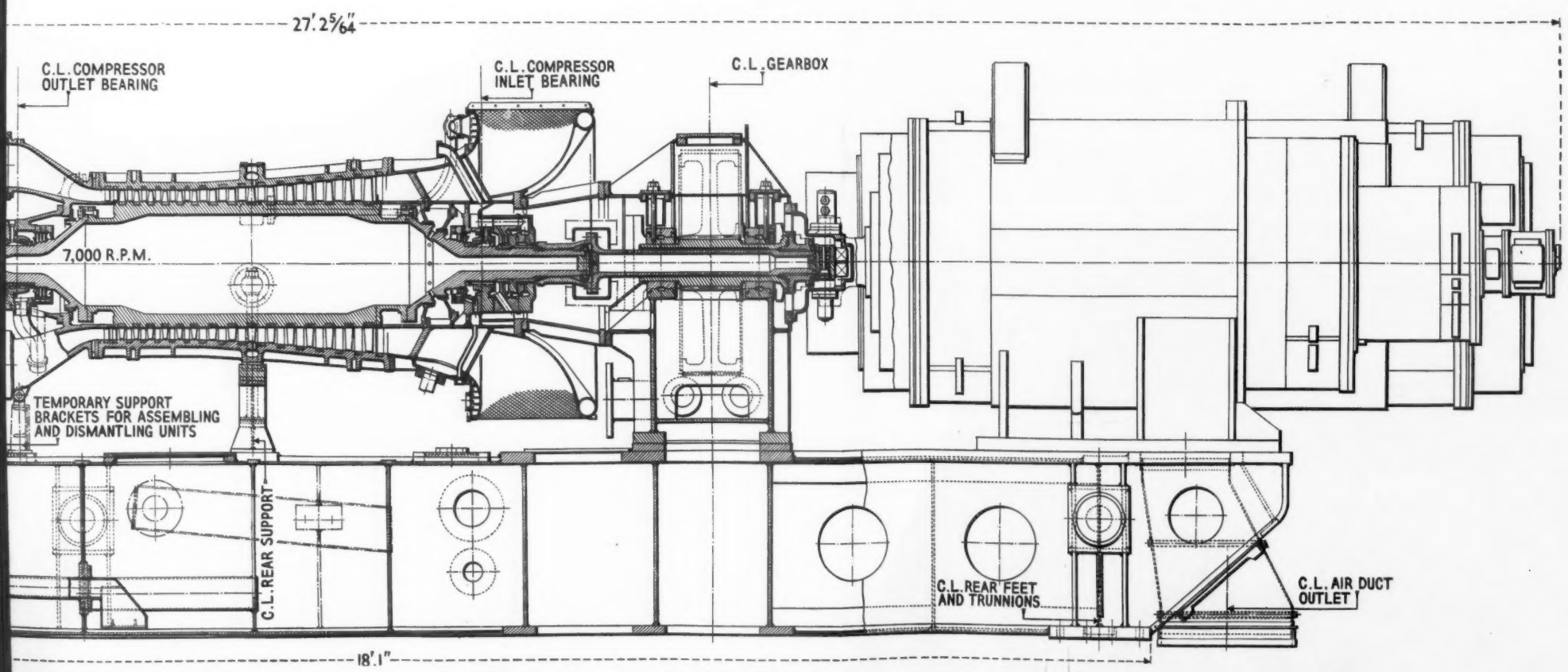


Sectional elevation of the 3,000-h.p. power unit of the Metropolitan-Vickers Gas-Turbine Locomo

GAS-TURBINE LOCOMOTIVE BUILT BY METROPOLITAN-VICKERS ELECTRICAL CO. LTD., FOR BRITI



Sectional elevation and plan showing the layout of the equipment

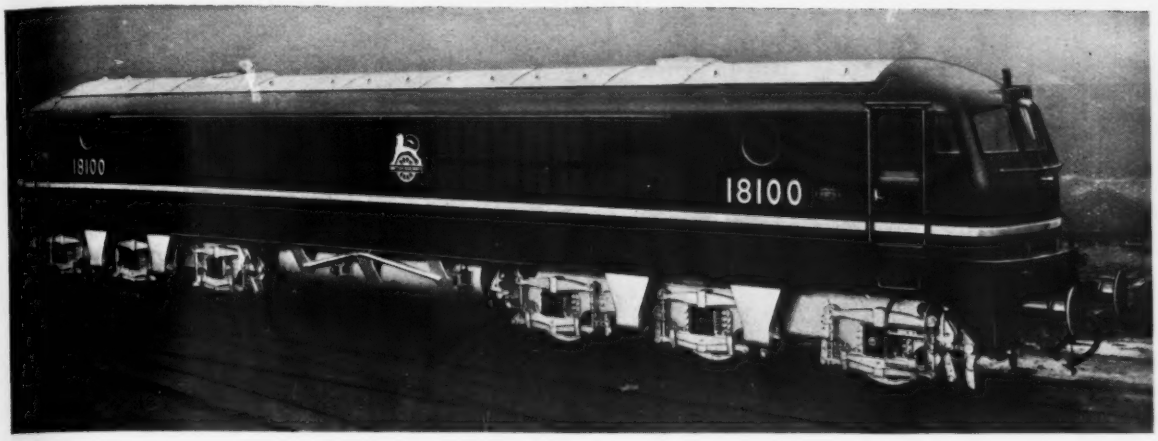


elevation of the 3,000-h.p. power unit of the Metropolitan-Vickers Gas-Turbine Locomotive

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., FOR BRITISH RAILWAYS (WESTERN REGION)

British-Built Gas-Turbine Locomotive

Metropolitan-Vickers 3,000-h.p. locomotive for the Western Region incorporating an open-cycle gas turbine without heat exchanger



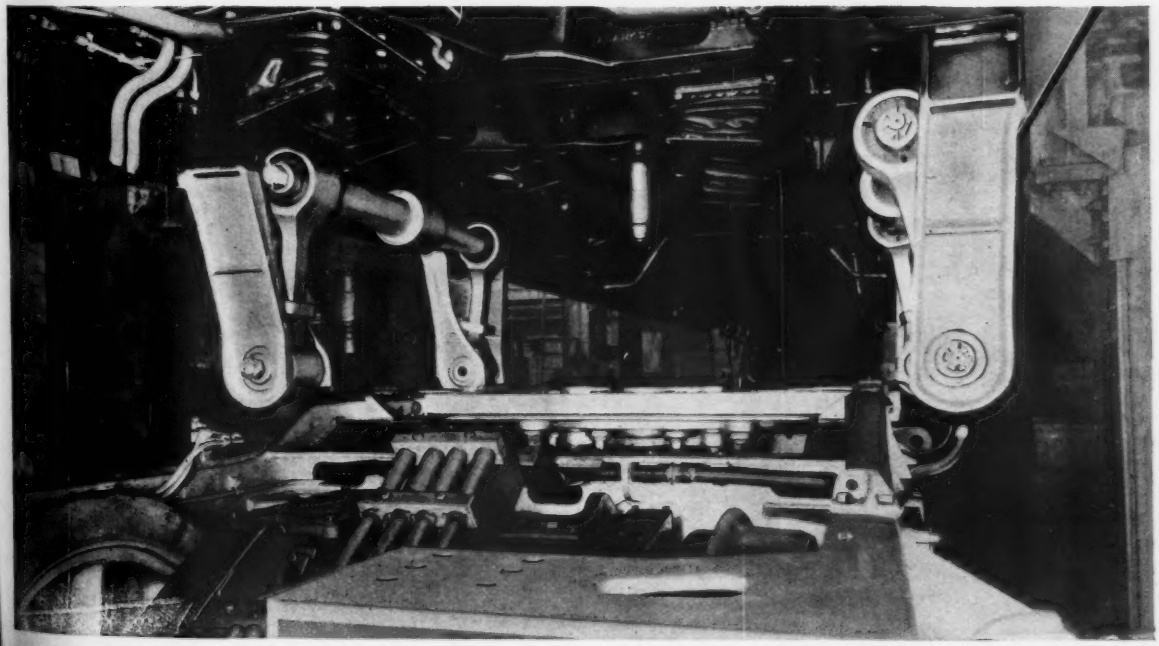
BRITISH Railways second gas-turbine locomotive, No. 18100, designed and built by the Metropolitan-Vickers Electrical Co. Ltd., will shortly be placed in service on the Western Region, British Railways. The locomotive was built to the requirements of the former Great Western Railway, and the work has been carried forward by the Railway Executive under the direction of Mr. R. A. Riddles, Member of the Railway Executive for Mechanical & Electrical Engineering.

The leading particulars of the locomotive are as follow:—

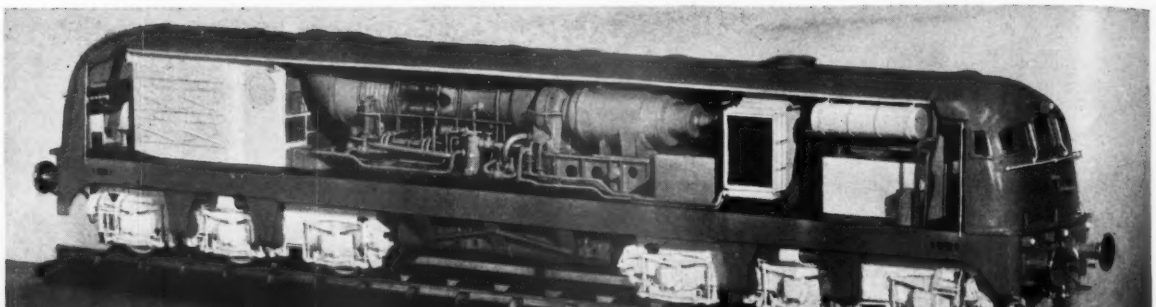
Mechanical type	Double bogie
Continuous rating of turbine ...	3,000 h.p.
Number of axles	6 (all driving)
Weight in working order	129 tons 10 cwt.
Maximum service speed	90 m.p.h.
,, tractive effort	60,000 lb.
Continuously rated tractive effort...	30,000 lb.
Length over buffers	66 ft. 9½ in.
Width	9 ft.
Height from rail	12 ft. 10 in.
Wheel dia.	3 ft. 8 in.
Fuel	Gas oil

The body of the locomotive and underframe are built as a single unit almost entirely by welding. The principal members, the solebars, consist of continuous plates of deep section reinforced by top and bottom welded plates tied together at each end by the welded headstock structures. The solebars are attached by fitted bolts to the principal body members, which consist of welded assemblies. The underframe is further reinforced by cross-bracing of rolled-steel sections and by the floorplate.

At cantrail height a ribbed curved plate section of the roof forming a rigid



Underside of locomotive before lowering on to bogies, showing the body suspension swing-link system



Model of locomotive, cut away to show layout of equipment

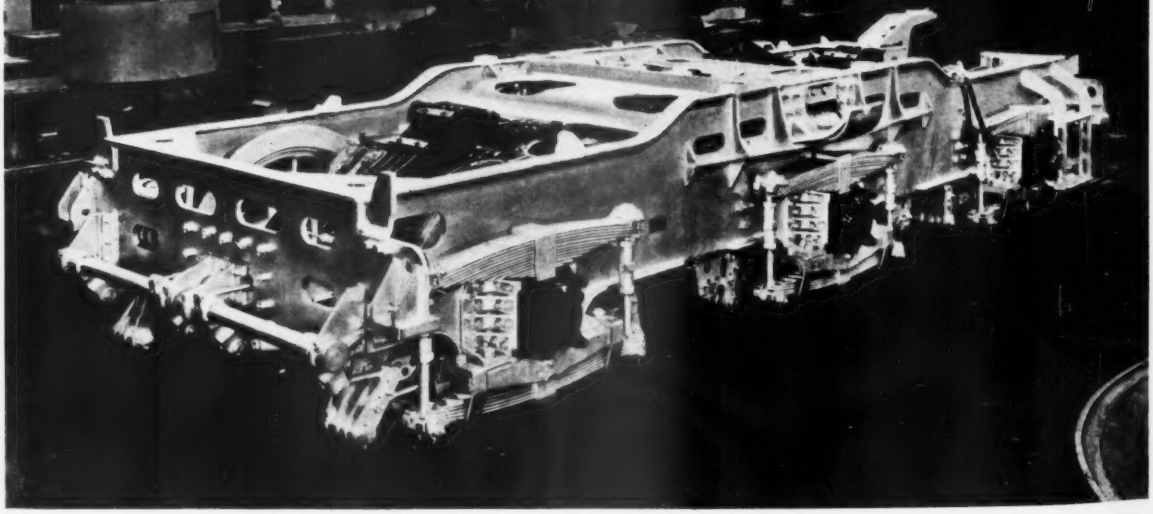
boom extends on each side of the body, except the cabs. The body panels are attached by welding to this boom, and also to the solebars and carlines except where space is left for air filters and louvres; the roof sections between the booms are of aluminium alloy and are suitably arranged so that equipment can be removed. Both driving cabs, which are identical, are a separate welded structure of aluminium alloy, and are mounted on the underframe platform.

The bogies are of welded construction consisting of plate with welded flanges, the side frames being connected by headstocks and also by two cross-stays, all of welded plate. Each complete bogie frame and each main welded subassembly of the body structure has been stress relieved. The body structure is carried on the two bogies by swing links attached by rubber resilient universal joints to permit controlled swing bolster action and bogie pivoting, without the use of bolsters, for which there was insufficient room between the bogie frames and within the fixed wheelbase.

Eight swing links are provided, two on each side of the bogie, and outside the bogie frame. Each link-end contains a rubber universal joint without metallic contact. The lower joint in each case is attached to the lower end of the body support brackets, and pairs of upper joints are attached by longitudinal equalising beams, in the middle of which is a rubber universal joint resting in the corresponding bogie support bracket. The resilience of the rubber joints permits the relative angular motion between body and bogies on the vertical and transverse axes and also the relative movement necessary for smooth running at high speeds.

The restoring forces are mainly those due to gravity. Damping is provided by hydraulic dampers located at four points on each bogie connected between the body underframe and the bogie frames by links having universal rubber joints. These resist lateral displacements and vertical axis rotation of the bogies relative to the body. Longitudinal reactions between the body and the bogies due to traction and braking forces are taken through a pivot pin on the body which carries a parallel motion linkage coupled to the bogie cross-stays and fitted with universal joints.

A feature of the use of rubber is that it dispenses with lubrication and the consequent rectification necessary to metallic surfaces. A further feature is the absence of metallic connection between the body structure and bogies and therefore the isolation of the body from high frequency vibrations due to track irregularities. The axleboxes are of the Hoffmann type, with two rows of rollers and one row of balls for end location; oil lubrication is provided. The axle-



One of the locomotive bogies of welded construction, showing the traction motors and spring arrangement

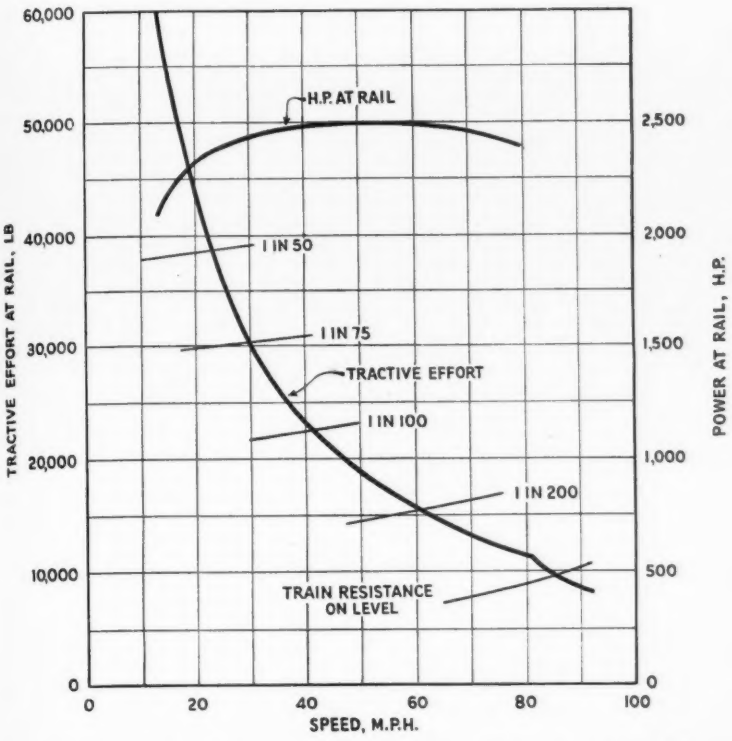


Fig. 1—Locomotive performance diagram with an 18-coach train of 650 tons

box wearing surfaces are of manganese steel, with hardened steel on the horn guides, grease lubricated. At each end the horn guide is of the trunnion type to permit canting of the axle in relation to the bogie.

Locomotive Performance

Each bogie has three driving axles, each driven through a single reduction gear by a traction motor suspended on the axle and from a support on the bogie frame. The turbine rotates at 7,000 r.p.m. when delivering full load and drives the three main generators at 1,600 r.p.m. through single reduction gearing. This unit has two output shafts, one driving two of the main generators in tandem; the other drives the third main generator, the auxiliary generator, and the exciter.

The turbine, reduction gear, and group of generators are mounted on a common bedplate together with the main fuel pumps and lubricating pumps, and constitute a self-contained power unit. This unit is carried on three support points on the main underframe. Each of the three main generators supplies two of the six traction motors; the motor of each pair are connected permanently in parallel. From the turbine output of 3,000 h.p. an allowance of 150 h.p. provides for the loss in reduction gear and auxiliary equipment, leaving 2,850 h.p. input to the traction generators.

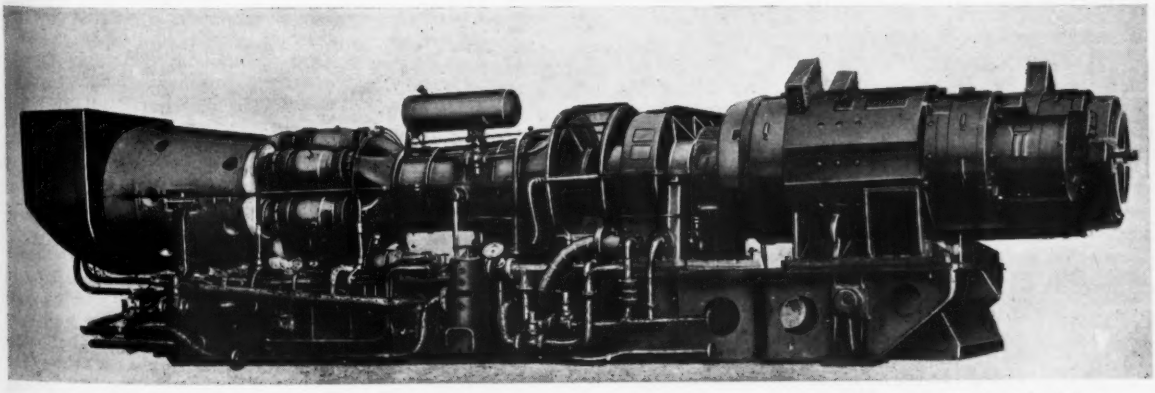
Over most of the speed range of the locomotive an electric transmission efficiency of about 86 per cent. is achieved, corresponding to 2,450 h.p. at the rails. As shown in Fig. 1, this power is sufficient to give an 18-coach train balancing speeds of 85 m.p.h. on the level, and 41 m.p.h. and 23 m.p.h. respectively when climoing gradients of 1 in 100 and 1 in 50. A turbine full-load thermal efficiency of 19 per cent. has been demonstrated on test. When account is taken of gear and electrical losses, the overall thermal efficiency of the locomotive becomes 16 per cent.

After deduction of the 75 h.p. required for auxiliaries, the remaining tractive power available at the wheels represents 15½ per cent. of the heat value of fuel consumed, or a fuel rate of 0·88 lb. per h.p. hr. At half power this rate will rise to about 1·3 lb.

The Gas Turbine

The prime mover is a simple open-cycle gas turbine without heat exchanger, and the cycle of compression, heating, and expansion of the air is carried out in a compressor, combustion chamber, and turbine arranged in line and built into a straight-through single unit, as shown in Fig. 2. The compressor is a 15-stage axial flow machine with a power ratio of 5·25 at 7,000 r.p.m. and a mass flow of 50 lb. per sec. The compressor runs in two sleeve bearings. The turbine is a five-stage unit also running in two sleeve type bearings, and its rotor is direct coupled to the compressor.

The combustion chamber is composed entirely of heat-resisting steel and consists of six flame-tubes with axes parallel to the machine axis and connected by flexible connections at one end to the compressor outlet and at the other to the turbine inlet. The compressor and turbine cylinders are connected by a tubular member surrounding their shaft coupling, and form a single unit on which the combustion chamber is mounted. The power unit is supported on four supports with sufficient flexibility to allow for expansion. A sliding key arrangement maintains its lateral position, and the inlet end of the compressor frame is



View of power unit, including combustion chamber, turbine, compressor, and generator mounted on bedplate

secured to the reduction gear casing which is bolted and also dovetailed to the bedplate; the total axial expansion at the turbine end is about $\frac{1}{8}$ in. The rotors of the compressor and turbine are located axially from a thrust bearing at the compressor inlet end.

The compressor cylinder is of malleable iron and the rotor is a forged-steel drum. The moving blades are machined from stainless-steel bar and the fixed blades are rolled from a similar material. The blades are retained in dovetailed slots; machined axially on the rotor and circumferentially in the cylinder. The bearings are white-metal lined and pressure oil-lubricated. A supply of compressed air is taken from an intermediate stage to a balanced piston at the inlet end for the purpose of balancing the end thrust of the combined rotors.

The turbine construction uses special heat-resisting materials, the cylinder being an austenitic steel casting and the rotor an austenitic steel forging. The blading material of the first stage of the fixed blades is of Nimonic, the second and third stages austenitic steel, and the fourth and fifth stage molybdenum steel. The first and second stages of the moving blades are of Nimonic, the third stage austenitic steel, and the fourth and fifth stages of molybdenum. The turbine bearings are similar to those of the compressor; additional cooling is provided by a flow of compressed air from an intermediate stage of the compressor.

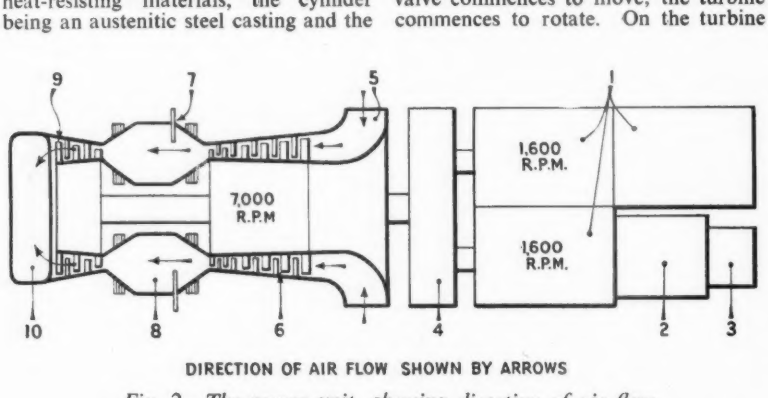


Fig. 2—The power unit, showing direction of air flow

Flame-Tubes

The six flame-tubes of the combustion chamber are secured by detachable unions to the compressor and turbine. The flame tube has an outer casing and inner primary chamber, both fabricated from austenitic heat-resisting steel. By means of metering orfices the correct proportion of the air flow is introduced into the primary to give correct combustion of the fuel fed in at approximately 650 lb. per sq. in. from the fuel jets. The remainder of the air is mixed with the very high temperature products of combustion downstream of the jets so as to produce the designed temperature at the turbine inlet.

Each flame-tube has a double fuel injector with a small jet orifice for idling fuel, and a large jet fed from the main fuel valve. Two flame-tubes are fitted with igniters, in the form of high-tension spark plugs, combined with pilot flame fuel jets. Ignition spreads to the other flame tubes through tubular connections between each pair of casings.

Method of Starting

In starting, the turbine is accelerated to a self-sustaining speed by the main generators acting as motors fed from the starting battery; once the driver has actuated the starting button the process is entirely automatic. Successive steps are initiated by a sequence controller driven at a controlled speed by an electric motor. The steps in progression are:—auxiliary fuel pump starts; main fuel and lubricant pump starts; igniters switched on; the automatic starting valve commences to move; the turbine commences to rotate. On the turbine reaching 1,000 r.p.m. the starting valve commences fuel delivery through the idling jets of the combustion chamber.

Thereafter the fuel combustion assists acceleration, and at approximately 2,500 r.p.m. the battery automatically disconnects from the main generators and the turbine continues acceleration under its own power to about 4,000 r.p.m. From starting to the idling of the turbine occupies 65 sec. and full power may be taken from the turbine after 10 min. warming up at idling speed or at low power.

On shutting down after full load running it has been found beneficial to allow a cooling period of about 10 min. at idling or low power work. On stopping the turbine an automatic barring sequence operates, which motors the turbine for a few seconds at intervals of 3 min. to equalise cooling stresses. An auxiliary lubricant pump circulates oil round the turbine bearings during this period, and is automatically stopped by a bearing thermostat at the appropriate time.

During the operation of the locomotive the turbine and generator are governed electrically to give the output selected by the driver on a master controller, and at the turbine speed for efficient operating at a particular load. In the event of a fault developing, excessive turbine speed or gas temperature, excessive bearing temperature, or fuel or lubricant fault, over-riding controls come into operation.

The three shafts of the reduction gear lie in a horizontal plane, the middle carrying the pinion and the others the gearwheel. The pinion is made of case-hardened steel in which the teeth are ground after hardening. The gearwheel rims are of 65-72 tons chrome molybdenum steel, the teeth being finished by the shaving process; the teeth, of 5 diametrical pitch, are single helical. Each shaft is hollow and rotates in two white metal sleeve bearings, and the driving shafts from the turbine and generators pass through the hollow shafts to couplings at the remote ends of these shafts. Flexibility is obtained in the drive without making the unit unduly long. Gears are enclosed in a fabricated steel gearbox, the gears and bearings being lubricated from the main turbine lubricating pump.

Main and Auxiliary Generators

Two of the three main generators form a tandem unit, their yokes being bolted together. Both armatures are mounted on a common shaft carried in roller bearings in the yoke endshields. The third main generator and auxiliary generator form a similar tandem pair; the yokes of both tandem sets are bolted side by side to make up the generator group. An exciter is overhung from the auxiliary generator. Each main generator is a self-ventilated d.c. six-pole compensated interpole machine, the field being fed from the exciter, Fig. 3. The ratings to B.S.S. 173-1941 for class B insulation are as follow:—

Continuous rating	...	1,100 amp. 660 V. 1,600 r.p.m.
One hr. rating	...	1,250 amp. 580 v. 1,600 r.p.m.
Maximum voltage	...	825 V.
,, current	...	2,200 amp.

The auxiliary generator and exciter are also self-ventilated d.c. machines. The former has six main poles and interpoles and is shunt-excited under the control of a voltage regulator to give 110 V. irrespective of its load and turbine speed. Its B.S. continuous rating (Class B insulation) is 65 kW., 110 V., 1,280 r.p.m. The exciter has six main poles and interpoles, and is excited by three windings—a separate excitation fed from the 110-V. auxiliary mains, a separate excitation regulated by the automatic output control gear, and a reverse compound excitation directly proportional to the main generator total load current. Its B.S. continuous rating (Class B insulation) is 10·5 kW., 55 V. over a speed range of 1,280 to 1,600 r.p.m. The method of construction and insulation are designed to meet the arduous conditions of railway operating.

Traction Motors

The six traction motors are separately ventilated four-pole series and interpole machines, each carried on its axle by plain suspension bearings; the armatures are fitted with roller bearings. The nose side of the motor yoke is suspended from the bogie transom by a link fitted

with a rubber bush at each end, a form of suspension which eliminates wear, combined with freedom of movement between the motor end and bogie. The transverse location of the motor in the bogie is by another rubber resilient bushed link between motor end and bogie main frames instead of by the more conventional location by thrust faces on the suspension bearings against the bosses of the gears, with the object of eliminating the uncontrolled lateral movement of the motor along the axle and thrust wear in the bearing.

The ratings of the motor to B.S. 173-1941 for class B insulation and ventilation air flow of 2,500 c.f.m. are as follow:—

Continuous rating	...	550 amp. 666 V. 706 r.p.m. (33·5 m.p.h.)
One hr. rating ...	...	650 amp. 565 V. 580 r.p.m. (27·5 m.p.h.)
Maximum current	...	1,100 amp.
,, voltage	...	825 V.

The drive to the axle is by a single reduction spur gearing 21-58 gear ratio 2·066 diametral pitch. The gearwheel incorporates torsional resilience, an arrangement which cushions transmission shocks from rail to armature and provides for better riding and reduced maintenance. The gearwheel centre, rims, and pinions are hardened by oil quenching.

Auxiliary Equipment

Most of the auxiliaries are electrically operated from the 110-V. d.c. supply from the auxiliary generator. The battery, consisting of 48 lead-acid cells of 384 amp. hr. capacity, is charged from this supply through a contactor which is closed only when the auxiliary generator is generating. Certain of the auxiliaries are battery fed and can be run only when the turbine is running.

Main fuel and lubricant pump.—Fuel and lubricant are supplied to the turbine by a pump set consisting of a 10-h.p. 3,000-r.p.m. motor, battery fed driving a feed pump overhung from the motor, and a lubricant pump mounted on a common bedp'ate with the motor. There are two of these sets, both carried on the main turbine bedplate. Only one works at a time, but it is automatically superseded by the other in the event of a failure of fuel or lubricant supply. The fuel pump is of the swashplate type and has a capacity of 75 gal. a min. at 650 lb. per sq. in. The lubricant pump is of the Imo type and delivers 70 gal. per min. at 50 lb. per sq. in.

Auxiliary fuel pump set. — The auxiliary fuel pump is driven at 1,400 r.p.m. by a battery-fed ¼-h.p. motor, the combined set being mounted adjacent to the main turbine bedplate. Its function is to supply fuel from the fuel tank on the locomotive underframe to the suction side of the main fuel pump. It is a gear type pump rated at 10 gal. a min. at 10 lb. per sq. in.

Auxiliary lubricant pump set.—The function of this set is to supply lubricant to the turbine and gear bearings during the cooling period, and is similar in capacity and design to the auxiliary fuel pump.

Lubricant Coolers.—The heat from the lubricant is dissipated in the cooling equipment comprising two air blast radiators. They consist of cooling tubes of the wire wound Clayton-Still pattern extending between the top and bottom headers. The air ducts are of aluminium sheet and converge at the entry to an axial flow 32½ in. fan mounted in the roof and driven by a 10-h.p. series motor at 1,480 r.p.m. fed from the auxiliary generator and drawing approximately 16,000 c.ft.m. of air through the cooling elements. Heat dissipation capacity is 120 kW. with 70° F. ambient and 180° F. lubricant entry temperature.

Air Compressor.—This set supplies air at 100 lb. per sq. in. for operating the brakes, electro-pneumatic control apparatus, windscreen wipers, and so on. The compressor is air cooled and has a piston displacement of 38 c.ft.m. at 243 crankshaft r.p.m.; it is driven by a 8-h.p. motor. The motor is auxiliary generator fed. An automatic governor switches the motor on and off to maintain pressure in the main reservoir between 85 and 100 lb. per sq. in.

Vacuum Exhauster.—Two reciprocating four-cylinder exhausters provide the brake power for the train. Each is direct driven by a flange mounted motor at 750 r.p.m. for normal maintaining and application, and at 1,200 r.p.m. for release; both are stopped in an emergency application. The two machines are capable of creating 25 in. of vacuum in a train of 80 cu. ft. train pipe and cylinder capacity in 45 sec. The swept volume of each is 85 c.ft.m. at 750 r.p.m.; the power input is 4 h.p. The motors are battery fed so that the brakes will not be applied by the shutting down of the turbine in stations or when coasting.

Traction Motor Blowers.—The three traction motors on each bogie are force ventilated by a centrifugal blower direct coupled to a 11·25-h.p. auxiliary generator fed motor. The air is distributed by means of sheet aluminium ducts and leather bellows to the motor air inlet flanges at a rate of 8,000 c.ft.m. at 6 in. water gauge total head at 1,460 r.p.m.

Train Heating Boiler.—For the train heating requirements a vertical fire tube oil-fired boiler of 1,500 lb. hr. steam capacity is installed at 80 lb. pressure per sq. in. The operation is semi-automatic and a special feature is the provision of a high-pressure combustion air blower and flow retarders to ensure flame stability during air pressure fluctuations due to high train speed and tunnels.

Air Filters.—The 40,000 c.ft.m. of air required for the gas turbine at full load is drawn through filters installed in the turbine compartment. Of the dry fabric type, they can be cleaned by reverse blowing in position by compressed air nozzles provided in the turbine compartment, a feature which, it is considered, will materially reduce the rate of fouling of the blades.

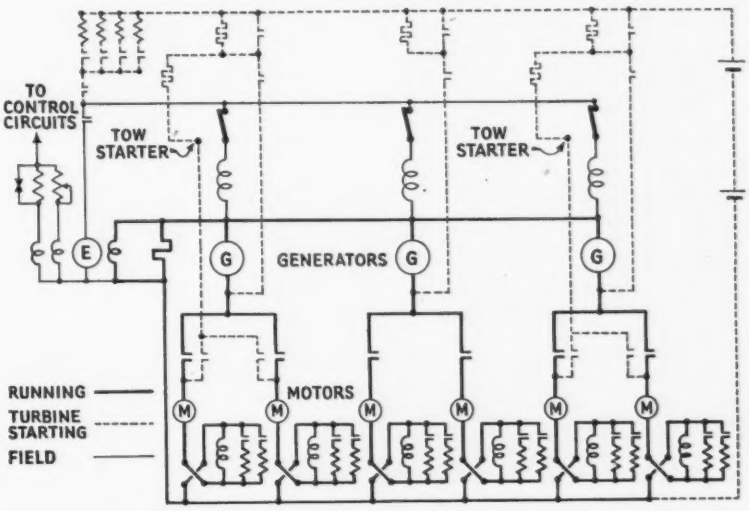


Fig. 3—Diagram showing traction electrical connections

Operation and Control

All operations for the stopping, starting, and control of the locomotive are remote controlled from either cab; the equipment installed in each cab is identical. All controller handles, push buttons, and indicating instruments are grouped conveniently on the driver's desk. The procedure for starting the locomotive is extremely simple. The driver requires only to operate the switch key and to press the turbine start button, and on a green light appearing one minute later indicating that the turbine is running at idling speed, switch on the brake compressor and exhauster. The locomotive is ready for service after a 5 min. warming up period when starting from cold.

To move the locomotive with or without load the brakes are released, the re-

versing lever of the master controller moved in the correct direction, and the power lever set to the position required. This lever has no notched position, but can be set and left in any position between no power and full power. For simplicity, this same lever determines the starting tractive effort developed between that required for locomotive manœuvring and a maximum determined by wheel slip consideration. The driver need not notch up this lever as the train speed rises. The sequence and timings of the various events in the process of starting the turbine are determined by a drum-type sequence controller driven by an electric motor. Similar means are used to regulate the periodic running of the turbine during cooling.

The driving technique required has been simplified by an elaborate system of control and has been designed to provide means for the driver to control the speed of the train by regulating the tractive effort developed at the wheels. In general, the control equipment function is to relate to each quantity to be regulated a proportionate voltage, and to cause that voltage to control relays, and to provide electric servo means for adjusting the quantity to the required value. As an example, if traction conditions change so as to demand a higher tractive effort, such as a rising grade, the increase of current to the traction motors from the main generators causes the turbine speed to drop.

This is immediately reflected in a reduction of voltage from a tachometer generator driven by the turbine. This, through the medium of a voltage relay, weakens the excitation of the generators to reduce their output voltage in the ratio of increased current demand, thus maintaining the turbine output at the value selected by the power lever of the master controller. The equipment used in the main power circuits is the same as for an electric locomotive. Each traction motor is controlled and protected by an electro-pneumatic unit switch, and its field is reversed by an electro-pneumatic drum switch.

The auxiliary circuits are also controlled by conventional electric traction apparatus. In the subsidiary control and regulating circuits special devices have been designed whose function is to apply to servo devices in the control circuits, voltages proportional to the response required by the position in which the driver has placed the controller lever. These servo devices are of the vibrating contact type and they control field strengths and servo motors to produce the desired result.

The combined fuel and boiler water tank is located under the underframe between the bogies. A transverse division plate separates the 995 gal. fuel section from the 660 gal. water section. Both sections can be made available for fuel if required by removing a cover from an aperture in the division plate; remote tank reading is provided. With the exception of these tanks all the equipment is housed inside the body of the locomotive.

The following sub-contractors supplied materials for the locomotive:—

Brake equipment, air compressor and vacuum exhausters	Westinghouse Brake & Signal Co. Ltd.
Machining and assembly of bogies and bogie components	Yorkshire Engine Co. Ltd.
Train heating boiler ...	Spanner Boilers Limited (Laidlaw-Drew-Spanner burner)
Wheels and axles	Taylor Bros. & Co. Ltd.
Axleboxes	Hoffmann Manufacturing Co. Ltd.
Springs	Jonas Woodhead & Sons Ltd.
Buffers	Geo Turton, Platts & Co. Ltd.
Hydraulic dampers ...	Girling Limited
Swing link resilient units	Metalastik Limited
Draw-buff and other resilient units	Silentbloc Limited
Aluminium alloy	James Booth & Co. Ltd.
Pneumatic warning horn (Desilux)	C.V Desiderio Limited
Battery	Chloride Batteries Limited
Air filters	Vokes Limited
Blowers for traction motors	Keith Blackman & Co. Ltd.
Cooler fan for lubricating oil	Davidson & Co. Ltd.
Main fuel pumps	Dowty Equipment Limited
Main lubricating pumps (IMO)	Mirrlees (Engineers) Limited
Auxiliary fuel and lubricant pump	Varley Pumps & Engineering Limited

View of one of the driving cabs, both of which are identical

INSTITUTE OF METALS ESSAY COMPETITION.—The council of the Institute of Metals is to present annually two prizes of twenty guineas each for the best essays. Each prize will be in the form of ten guineas in money and ten guineas in books. The competition is open to all Student Members of the Institute and to all Associate Members of Local Sections eligible for Student Membership provided that both are within the age limits of 17 to 25 years. For the 1952 competition candidates may select a subject which comes under one or other of the following two headings and one prize will be given under each subject: (1) "Non-Ferrous Foundry Practice" and (2) "Metallography in Industry." Each entry must be submitted to the Secretary, Institute of Metals, 4, Grosvenor Gardens, London, S.W.1, not later than May 19.

EXPENDITURE ON ROAD TRANSPORT.—During 1950, about £1,200 million is estimated to have been spent on transport and travel by road in Britain, compared with £1,100 million in 1949. In a lecture on "Estimates of Expenditure on Road Transport in Great Britain" before the Royal Statistical Society, Mr. E. Rudd, of the Road Research Laboratory of the Department of Scientific & Industrial Research, said that these estimates were made to assist in research on roads. The figure for 1950 included £540 million spent on transport of goods by road, £210 million on travel by bus, coach, tram and trolleybus, and £340 million on private motoring. This expenditure on road transport and travel, said Mr. Rudd, was three times as great as that on all other forms of internal transport, and directly absorbed some 11 per cent. of the national income.

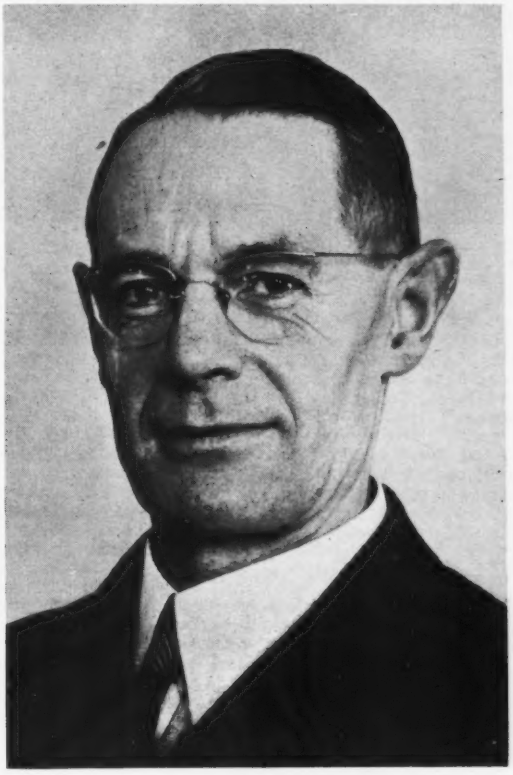
RAILWAY NEWS SECTION

PERSONAL

Mr. R. K. Innes, Chief Mechanical Engineer, Western Railway, India, has retired.

Mr. H. H. Dyer, M.I.E.E., M.I.R.S.E., who retired on December 31 as Chief Executive Officer, Engineering (Signal & Telecommunications), Railway Executive, is the elder son of an old Reptonian, the late Mr. A. H. Dyer, of Derby, and was himself educated at Derby School and Christ's College, Finchley. He received his technical education at Derby, Nottingham, and Birmingham. He joined the Telegraph Department, Midland Railway, Derby, as an engineering apprentice in 1907, and after training was appointed a Technical Assistant. Mr. Dyer had over 20 years' out-door experience, mainly in connection with electrical signalling and communications, on both new works and maintenance. During that time, he acted as Resident Engineer in charge of the re-signalling of the electrified lines between Bow Road and Barking. On the formation of an independent Signal & Telegraph Engineer's Department of the L.M.S.R. under Mr. A. F. Bound, in 1929, Mr. Dyer was appointed Assistant (Signals) at headquarters, Derby. He was made Development Assistant in 1931. In those positions he gained a wide experience of mechanical signalling and on appointment as Electrical Assistant in 1935 he was made responsible for both mechanical and electrical design. He was appointed Assistant Signal & Telegraph Engineer in October, 1944, and Executive Officer, Engineering (Signal & Telecommunications), Railway Executive, in January, 1948, being appointed Chief Executive Officer six months later. Mr. Dyer was President of the Institution of Railway Signal Engineers for 1946, in which year he visited Canada and the U.S.A. to study the latest signalling developments there. He has since visited Belgium, France, Italy, and Switzerland to study signalling methods in those countries and he represented British Railways and certain overseas railways on signalling matters discussed at the International Railway Congress Association meetings in Rome in 1950.

Mr. H. H. Dyer
Chief Executive Officer, Engineering (Signal & Telecommunications), Railway Executive, 1948-51



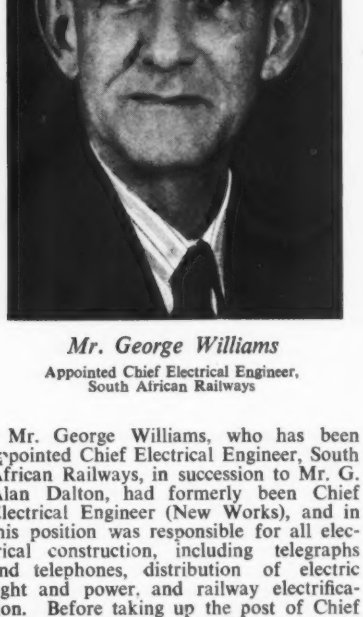
Mr. J. Holden Fraser
Appointed Chief Officer, Engineering (Signal & Telecommunications), Railway Executive

Mr. Gerald Collingwood, Managing Director of the Vulcan Foundry Limited, is at present on a visit to India and Pakistan, in connection with the Vulcan Foundry's centenary of locomotive building for India. Reference to a booklet issued for the centenary is made on page 119.

Mr. J. Holden Fraser, B.Sc., A.M.I.C.E., M.I.R.S.E., Signal & Telecommunications Engineer, North Eastern Region, York, who, as recorded in our December 21 issue, has been appointed Chief Officer, Engineering (Signal & Telecommunications) Railway Executive headquarters, London, joined the Stratford District Civil Engineering Department of the Great Eastern Railway in 1917. After military service in the first world war he returned to the Signal Section in 1919 and acted as Signal Engineer after the retirement of Mr. W. H. Bird. Mr. Fraser prepared an extensive scheme of colour-light suburban signalling and on the amalgamation of the G.N., G.C. and G.E. Engineering Departments in 1924 he was appointed Indoor Assistant to the Signal Engineer (Southern Area), acting also as Outdoor Assistant for the G.E. and southern half of the G.N. sections. In 1926 he became Signal Assistant at Edinburgh and in 1929 Chief Assistant (Signals), Scottish Area. In 1931 he was appointed Assistant Signal Engineer, N.E. Area, and in 1947 Assistant to Engineer (Signals). On nationalisation he was appointed Signal & Telecommunications Engineer, North Eastern Region, and was responsible for organising the Signal & Telecommunications staff into a separate Department, and for carrying out a number of important projects including the new signalling installation at York.

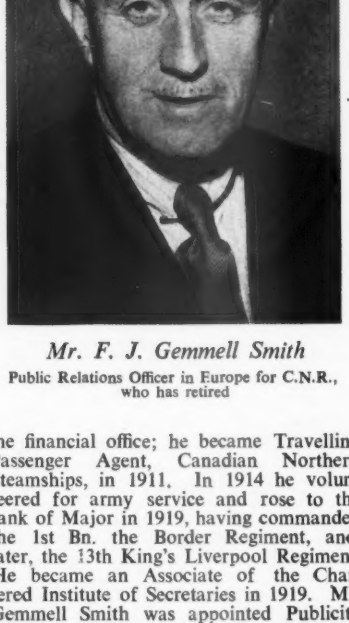
The United Steel Companies Limited announce that Mr. E. E. Ingleton has been appointed Works Manager of Yorkshire Engine Co. Ltd., Sheffield.

Mr. T. M. Jagtiani, formerly General Manager, Nizam's State Railway (now Central Railway), India, has become Operating Director of the Singareni Collieries in Hyderabad State.



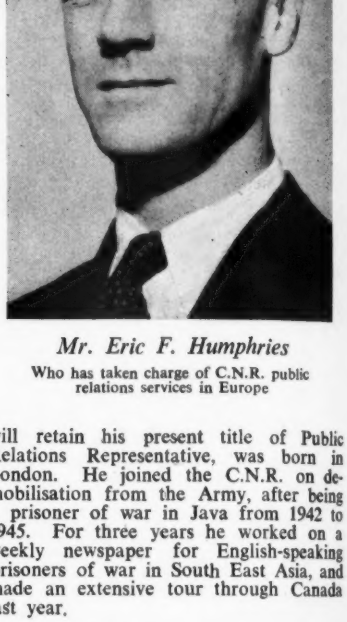
Mr. George Williams

Appointed Chief Electrical Engineer, South African Railways



Mr. F. J. Gemmell Smith

Public Relations Officer in Europe for C.N.R., who has retired



Mr. Eric F. Humphries

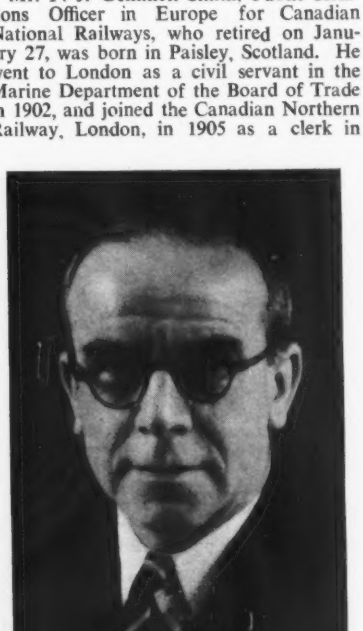
Who has taken charge of C.N.R. public relations services in Europe

Mr. George Williams, who has been appointed Chief Electrical Engineer, South African Railways, in succession to Mr. G. Alan Dalton, had formerly been Chief Electrical Engineer (New Works), and in this position was responsible for all electrical construction, including telegraphs and telephones, distribution of electric light and power, and railway electrification. Before taking up the post of Chief Electrical Engineer (New Works), he had been System Electrical Engineer, Transvaal Western System.

Mr. F. J. Gemmell Smith, Public Relations Officer in Europe for Canadian National Railways, who retired on January 27, was born in Paisley, Scotland. He went to London as a civil servant in the Marine Department of the Board of Trade in 1902, and joined the Canadian Northern Railway, London, in 1905 as a clerk in the financial office; he became Travelling Passenger Agent, Canadian Northern Steamships, in 1911. In 1914 he volunteered for army service and rose to the rank of Major in 1919, having commanded the 1st Bn. the Border Regiment, and, later, the 13th King's Liverpool Regiment. He became an Associate of the Chartered Institute of Secretaries in 1919. Mr. Gemmell Smith was appointed Publicity Agent, Canadian National Railways, London, in 1920, Publicity Representative in 1934, and Public Relations Officer in 1951. He served with the Royal Engineers from 1940 to 1945. He has visited each of Canada's ten Provinces, and is Honorary Secretary, Canadian News Advertising & Publicity Club, London.

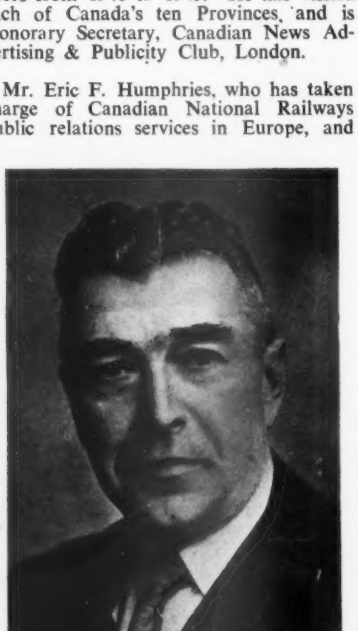
Mr. Eric F. Humphries, who has taken charge of Canadian National Railways public relations services in Europe, and will retain his present title of Public Relations Representative, was born in London. He joined the C.N.R. on demobilisation from the Army, after being a prisoner of war in Java from 1942 to 1945. For three years he worked on a weekly newspaper for English-speaking prisoners of war in South East Asia, and made an extensive tour through Canada last year.

Mr. J. J. Finlayson, M.I.Loco.E., Locomotive Works Manager, Gorton, in the London Midland Region, who, as recorded in our January 25 issue, has been appointed Locomotive Works Manager, Swindon, Western Region, was educated at Allen Glen's School and the Royal Technical College, Glasgow. Following an apprenticeship from 1918 to 1923 with the North British Locomotive Co. Ltd., he entered the service of the L.N.E.R. in the



Mr. J. J. Finlayson

Appointed Locomotive Works Manager, Swindon, Western Region



Mr. John E. Rigby

Appointed District Goods Superintendent, Manchester, London Midland Region

Mr. W. P. Allen

Appointed Assistant to Commercial Superintendent (Freight), North Eastern Region

Chief Mechanical Engineer's Department at Cowlairs Works. After a period in the Drawing Office, he held various appointments and in 1934 became Assistant to the Works Manager (Plant & Road Motors). Three years later Mr. Finlayson was appointed Assistant to the Works Manager (Carriages & Wagons) and in 1942 became Assistant to the Works Manager (Locomotives), Cowlairs. In 1945 he became Acting Assistant District Locomotive Running Superintendent, Western District, Scotland, returning to Cowlairs Works the following year as Assistant Works Manager. Mr. Finlayson transferred to Gorton in 1947, where he took up the post of Locomotive Works Manager.

Mr. John E. Rigby, District Goods Superintendent, Bolton, London Midland Region, who, as recorded in our January 4 issue, has been appointed District Goods Superintendent, Manchester, began his railway career in 1906 as a clerk at Penistowles. Seven years later he was transferred to the Bolton District Goods Manager's Office, where he served in various capacities. Mr. Rigby subsequently, held appointments as Goods Agent at Todmorden and Moses Gate, and in 1930 he served on various district and headquarters clerical and reorganisation committees. In 1933, he was transferred to the Manchester District as Assistant Agent for Accounts, returning to the Bolton District in 1935 as Goods Agent, Burnley, which position he held until April, 1938, when he was appointed Goods Agent, Preston. During his term of office at Preston he acted as a lecturer at the L.M.S.R. School of Transport at Derby. Mr. Rigby returned to the Manchester District in January, 1940, as Goods Agent, Oldham Road. In March, 1942, he became Operating Assistant to the Manchester District Goods Manager, and he has subsequently held appointments as Assistant District Goods Manager, Bolton; Agent for Accounts, Manchester; and Assistant District Goods Manager, Manchester. He became District Goods Manager, Bolton, in 1947.

Mr. W. P. Allen, M.C., M.Inst.T., District Goods Superintendent, Newcastle, North Eastern Region, who, as recorded in our January 11 issue, has been appointed Assistant to Commercial Superintendent (Freight), joined the North Eastern Railway in 1910, after leaving St. Peter's School, York, and during the next four years received training in all branches of traffic department work. He was commissioned during the first world war and awarded the Military Cross. He returned to the General Superintendent's Office, York, and subsequently became Head of Trains & Demurrage Section of the Goods Manager's Office, York, and Chief Staff Clerk, Superintendent's Office, York. In 1927 he was appointed Dock Superintendent, Middlesbrough. Mr. Allen became District Goods & Dock Manager at West Hartlepool in March, 1940, and during his stay there was Chairman of the Port Emergency Committee, Ministry of War Transport, and Member of the Hartlepools Port & Harbour Commission. Between 1943-45, when he was Acting District Goods Manager at Hull, he served as Deputy Chairman of the Port Emergency Committee, Ministry of War Transport, and a Member of the Humber Conservancy Board. Before taking up the post of District Goods Manager (now designated District Goods Superintendent) at Newcastle in 1945, Mr. Allen was Acting District Superintendent at Darlington for a short time. Whilst at Newcastle he was a Member of the Blyth Harbour Commission.

Mr. J. E. Malam has been appointed a Director of Murex Limited.

Mr. J. H. Verstegen, Chief of Signal Department, Netherlands Railways, is retiring today, February 1.

The North Eastern Region has announced the appointment of Mr. Charles Oliver Jenkin-Jones, Assistant District Operating Superintendent, Glasgow, as District Operating Superintendent, Leeds Central.

Mr. A. M. Stimpson, Second Assistant (General), Office of Chief Regional Officer, Eastern Region, Liverpool Street, has been appointed Senior Assistant (General) in the same office.

We regret to record the death in Buenos Aires of Mr. G. R. Mawson, a former Assistant Commercial Superintendent of the Buenos Ayres Great Southern and Buenos Ayres Western Railways, who retired in 1948.

Sir Andrew McCance has accepted the invitation of the Lord President of the Council to be Chairman of the Mechanical Engineering Research Board of the Department of Scientific & Industrial Research in succession to the retiring Chairman, Sir Henry Guy.

Mr. John W. Brophy has become Acting General Manager of General Motors Diesel Limited, London, Ontario, following the appointment of Mr. E. V. Rippingille, Jr., as Director of the aircraft division of the Canadian Department of Defence Production. Mr. Rippingille is continuing as President of General Motors Diesel Limited.

Thos. Cook & Son (Continental & Overseas) Ltd., has announced that Mr. H. V. Hartley has been appointed a Vice-President of Thos. Cook & Son Inc., which title he will hold jointly with that of Pacific Coast Manager. Mr. R. F. Cummings has been appointed Assistant General Manager for Canada, holding that title jointly with that of Branch Manager of Montreal office.

Dr. C. J. Smithells, Director of Research, the British Aluminium Co. Ltd., has been elected President of the Institute of Metals for the year 1952-53, and will take office on March 25. Mr. G. L. Bailey, Director, British Non-Ferrous Metals Research Association, and Dr. S. F. Dorey, Chief Engineer Surveyor, Lloyd's Register of Shipping, have been elected Vice-Presidents for the same session.

Mr. J. P. F. Ogilvie, who, as recorded in our December 7 issue, has retired as Controller of Stores, Rhodesia Railways, joined the Rhodesia Railways as Assistant Engineer in charge of construction and deviations on the Portuguese East Africa Section in January, 1926. He was appointed Assistant Engineer, Maintenance of Line, in Portuguese East Africa in 1930, and Chief Indoor Assistant to the Chief Engineer in 1934. The following year Mr. Ogilvie became Senior Assistant Engineer, Bulawayo District, and in 1941 was called up for full-time service with the armed forces. In 1942 he was appointed General Manager, British Military Administration, Franco-Ethiopian Railways, and became Assistant Director of Transportation, East Africa Command, with the rank of Lt.-Colonel, R.E., in 1943. While on active service he was appointed District Engineer, Rhodesia Railways, in 1944, and after being demobilised in February, 1946, became Stores Superintendent in April of that year. Mr. Ogilvie was appointed Controller of Stores in 1949.

Mr. F. B. Lowry, General Manager of the General San Martín Railway, Argentina, has returned to his post after a period of sick leave.

Mr. William H. Clark has been appointed General Purchasing Agent of the American Locomotive Company, in succession to Mr. William K. Farrell.

Monsieur Antoine Pinay, Minister of Public Works & Transport in the outgoing French Government, has again assumed this portfolio in the new Cabinet.

We regret to record the death in Mercedes, Argentina, of Mr. Hugo Miatello, who retired in 1940 from the post of Chief of the Rural Development Department, Central Argentine Railway.

We regret to record the death of Mr. C. E. Ayres, O.B.E., who retired as Operating Superintendent (Country Buses & Coaches), London Transport Executive, in July, 1951.

Monsieur Paul Romain, Director General of S.A. des Ateliers de Construction de Familleureux, Belgium, has been promoted to Commandeur de l'Ordre Leopold II.

Dr. Armin Im Obersteg, who represented the L.S.W.R. and Southern Railways as their General Passenger Agent in Switzerland for nearly 30 years, and has been Legal Adviser to the British Consul General at Basle since 1912, has been awarded the King's Medal for Service in the Cause of Freedom.

Mr. Leslie C. W. Jenkins, Chairman & Joint Managing Director, John Wright & Sons (Veneers) Limited, who has completed 50 years with that company, recently was the recipient of a presentation from the works personnel of an engraved silver pen and ink stand, and a handmade illuminated address volume, which included signatures of the Directors and a hand-lettered list of the works personnel, from the board of Directors. On January 11, at the Abercorn Rooms, Great Eastern Street, the staff presented Mr. Jenkins with an inscribed silver gilt bowl and the company gave the last of the great Bibles available for private distribution.

Thomas De La Rue & Co. Ltd. has announced that, as part of a reorganisation of the higher administration, a separate board of management has been constituted for each of the two main divisions into which the company's business is divided. Membership of these boards is as follows: Security board: Mr. B. C. Westall, Chairman & Joint Managing Director; Sir Donald Banks, Messrs. E. G. Gough, A. E. Houseman, and A. G. Norman. Industrial board: Mr. J. Eerdmans, Joint Managing Director, Messrs. G. Martin Turner, E. A. Davis, H. E. Poyser, and V. H. Dyson. As a result of their appointment to these boards, Messrs. G. Martin Turner, A. E. Houseman, and A. G. Norman have resigned from the board of the company. The board have also accepted the resignation of Mr. W. F. Wardley.

Ministry of Transport Accident Report

Stobcross, Scottish Region, British Railways: June 9, 1951

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport, inquired into the accident which occurred at 2.59 p.m. on June 9, 1951, at Stobcross on the Glasgow Central low-level line, when the 1.30 p.m. excursion special Renfrew to Balloch, consisting of ten non-corridor vehicles, conveying 550 passengers —about 300 being children—drawn by a 2F class 0-6-0 engine, which was standing at the No. 1 home signal for Stobcross, was overtaken at about 30 m.p.h. by the 2.18 p.m. train, Glenboig to Maryhill, composed of three non-corridor coaches, in which no passenger was travelling, drawn by a Class III 2-6-2 tank engine, wrongly admitted to the block section.

The rear portion of the excursion was badly damaged, but was lightly filled. There were no passengers in the last two vehicles. Fourteen passengers and three railway servants sustained slight injuries or shock. The front portion of the excursion was drawn forward into Stobcross Station. Cranes could not be used owing to the line being in tunnel and it was not cleared for traffic until 2.30 p.m. the next day. The weather was clear and dry, and there was little smoke in the tunnel, where visibility was fair. The shock of the collision was absorbed by the stationary train which had its brakes off. The accompanying diagram shows the lines, signals, and so on, essential to the case.

The Stobcross signalman had forgotten the standing train, and two independent failures of the electric locking circuits enabled him to give "train out of section" and accept the Maryhill train irregularly from Glasgow Central (Anderston Cross box was switched out). Except at the latter station the section is entirely in tunnel. Normally it carries some 95 trains daily, with certain goods and light engine movements at Stobcross. Block working is by Tyer's semaphore type instruments, Caledonian pattern, with an additional third indication.

When "train on line" is taken the instrument remains locked until the train actuates a treadle, with home signal lever reversed, and energises a disc coil in the instrument itself. Two danger side failures are necessary to produce an irregular release, and actually occurred in this instance. When a starting signal is released for one pull by "line clear," its lever, when reversed, becomes backlocked until the relevant block instruments are put to "train on line"; there is sequential home to starting locking. There is a non-co-operative sealed release push-button for "train on line," to meet the case of treadle failure, but it was not touched in this instance.

The treadle was of the mercurial type with float-operated spring contacts. The spring carried by the float was connected by an uninsulated coiled stainless-steel bonding wire to a terminal plate. The fixed and floating contact arms were of metal and varnished. The treadle had been reconditioned in the Crewe shops, London Midland Region, in 1950.

It was found that the bonding wire, which should have cleared the fixed top contact arm by $\frac{3}{16}$ in., had become displaced and was making intermittent contact with it; the varnish had become chafed. The treadle circuit thus remained closed for long periods after a train had passed. This should not have exercised any effect until the signal lever was reversed, but the contact switch attached to it was found to have its arm disconnected from the rod connecting it with the lever tail. When such a fault occurs the contact arm should drop right down and open the circuit permanently, but it could not do so as some wooden casing below it prevented this. A pin of the correct size was found on the floor and a $\frac{1}{4}$ in. cotter pin, with one jaw only slightly opened. (The correct size of pin is $\frac{5}{32}$ in.). Both appeared to have belonged to the switch.

To prevent down trains being stopped unnecessarily in the tunnel short of the station the following instruction gives exemption from Rule 39A: "When the 'is line clear' signal for a train on the down main line has not been acknowledged by the box in advance and the down starting signal is at danger the down main line home signal may be taken off for the train to draw to the starting signal as soon as the 'train entering section' signal for the train has been received from the box in rear." Its intention is that levers 34 and 35 should be pulled on receipt of "train entering section." Rule 55 is exempt at signal 35.

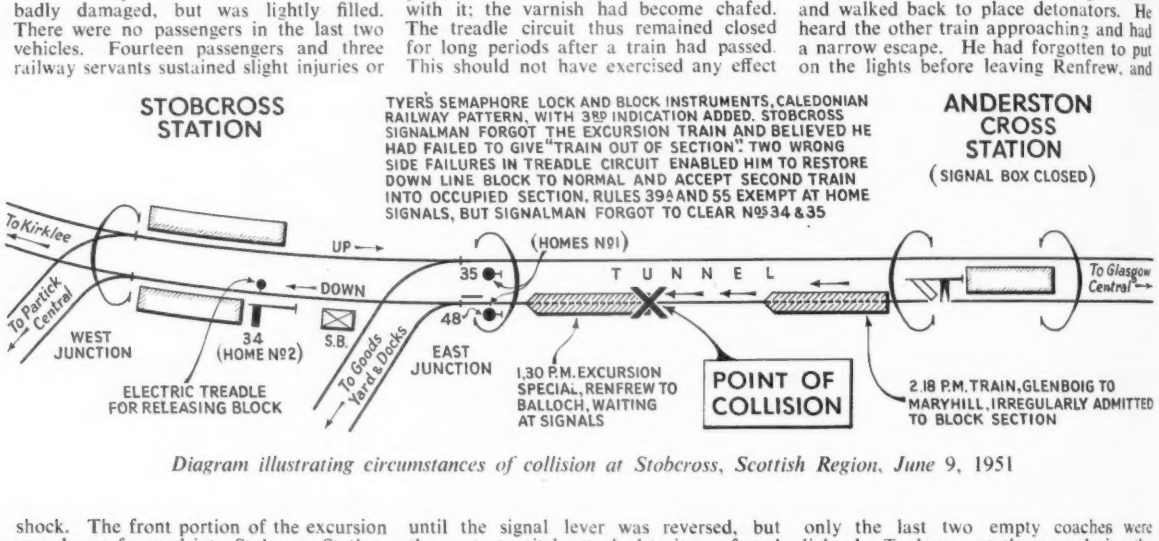

STOBCROSS STATION
TYER'S SEMAPHORE LOCK AND BLOCK INSTRUMENTS, CALEDONIAN RAILWAY PATTERN, WITH 3RD INDICATION ADDED. STOBCROSS SIGNALMAN FORGOT THE EXCURSION TRAIN AND BELIEVED HE HAD FAILED TO GIVE "TRAIN OUT OF SECTION". TWO WRONG SIDE FAILURES IN TREADLE CIRCUIT ENABLED HIM TO RESTORE DOWN LINE BLOCK TO NORMAL AND ACCEPT SECOND TRAIN INTO OCCUPIED SECTION. RULES 39A AND 55 EXEMPT AT HOME SIGNALS, BUT SIGNALMAN FORGOT TO CLEAR Nos 34 & 35
ANDERSTON CROSS STATION
(SIGNAL BOX CLOSED)
To Kirklee
To Partick Central
UP
DOWN
(HOMES No 91)
35
48
T U N N E L
To Glasgow Central
WEST JUNCTION
34 (HOME No 2)
S.B.
To Goods Yard & Docks
EAST JUNCTION
ELECTRIC TREADLE FOR RELEASING BLOCK
1.30 P.M. EXCURSION SPECIAL, RENFREW TO BALLOCH, WAITING AT SIGNALS
POINT OF COLLISION
2.18 P.M. TRAIN, GLENBOIG TO MARYHILL, IRREGULARLY ADMITTED TO BLOCK SECTION

Diagram illustrating circumstances of collision at Stobcross, Scottish Region, June 9, 1951

Evidence

The excursion passed Glasgow Central 40 min. late. The driver saw signal 35 at danger and stopped. He said he whistled immediately, but as nothing happened for two or three minutes he sent the fireman to the box, although Rule 55 was exempt there, as he "disliked the idea of standing in the tunnel." He released his brakes and suddenly was thrown on the footplate; he remembered "a clatter like a dummy dropping." He ran to the box, when the signalman said: "can you not come; you have the road?" He went back to see what assistance he could render. The fireman confirmed passing signal 35 at danger and getting about 200 yd. along when he heard the crash. The signalman asked him what train he was from, and told him he could pull into the station, so he concluded the signal had been cleared.

The guard became apprehensive when the train had stood 3 or 4 min., got down and walked back to place detonators. He heard the other train approaching and had a narrow escape. He had forgotten to put on the lights before leaving Renfrew, and only the last two empty coaches were lighted. To have put them on during the journey would have caused further delay, but he did so after the accident. There was no panic.

The driver of the 2.18 p.m. train said the starting signal at Glasgow Central was off and he left at 2.55. Stobcross distant was at caution and he made a light brake application. Although the atmosphere was only slightly hazy, neither he nor the fireman saw the tail lamp ahead, and did not know of the other train until they hit it. He thought the speed on colliding was 15 m.p.h., but the guard thought it was 30.

The report summarises the entries in the train registers at Glasgow Central, Stobcross, and Partick Central for the trains concerned and one preceding them, and points out that there was none at Stobcross for the excursion.

The signalman on duty at Glasgow Central from 1 to 3 p.m. said that as soon as he received "out of section" for the preceding train he offered the excursion, which was accepted. It passed and the block was put to "train on line." He received "out of section" for it, which he booked as 2.53 p.m., 6 min. after it ran through, and he immediately offered the train from Glenboig, which was accepted. On giving "entering section" he immediately after gave the routing signal for Maryhill. He did not do that before asking "is line clear?" It had not occurred to

him that Stobcross was slow in sending "out of section" for the excursion, but he admitted that his usual procedure, if "out of section" was overdue, which it was in this case, was to send the routing signal for the following train as a reminder.

Telephone Conversations

His replies to questions about telephone conversations with Stobcross were so contradictory that Colonel McMullen found it impossible to elicit whether there had been any, and, if so, when and to what train it referred. It seemed from other evidence that there had been some such conversation in which either he or the man who relieved him at 3 p.m. had spoken. It was clear that he did not know the special train programme, although he said he read the weekly notices.

The man who relieved him came on duty when the colliding train was just arriving and saw the down line block to be normal. He pointed this out, and the other man offered the train forward. He could not remember whether the man already on duty had sent any routing signal, but was told by him that "out of section" for the excursion had not been received, which he did not question, although the block indication was normal. He remembered no telephone conversation with Stobcross.

The signalman at that box, who had been one for 41 years and at Stobcross for 26, had reached retiring age on March 25, 1951, but had been asked to remain until October, to cover seasonal traffic. He accepted the excursion and received "entering section," but forgot to make any register entries and failed to offer it forward. He could not understand why. It might have been on account of Control ringing up about the opening of Partick box (as that was opened at 2.39 p.m. this conversation must have been held very much earlier).

He understood his special instructions, but somehow forgot to clear his home signals for the train. He said he then received the routing signal for the Maryhill line. The block was at "train on line"; he thought he had failed to give "out of section" for the excursion and it must have passed. He thereupon operated his instrument so as to restore it to normal, and was offered the 2.18 p.m. train and accepted it. He received "entering section" but did not offer the train forward. Seeing a fireman coming from the tunnel he cleared his home signal. He heard the noise of the collision faintly, but did not know what it was. He had heard no whistle, and thought the fireman was from the 2.18 train. He recalled speaking to Glasgow Central about certain up trains, also asking about the excursion, and a reply "I do not know; I am just newly in." He had not been spoken to from there about either the excursion or the following train.

This signalman could not account for his lapse, but was certain that if he had found his instrument plunger latched he would have remembered the excursion had not passed, and would not have used the sealed release. Although he had extracted the special trains from the weekly notices he seemed somewhat uncertain about the matter, perhaps because some were running out of course. He felt in good health, was not tired or overstrained, and work had not been heavier than usual. He had been medically examined after treatment for hernia in 1945 and on joining the service.

The Stobcross stationmaster, at another station when the accident occurred, spoke to the signalman. He said he was not excited, not indeed normal, but still "quite cool." He was a man regular and conscientious at his work. The stationmaster said also that he had checked the train register regularly and noticed nothing unusual.

Later it was found that 43 omissions had been made in the previous three weeks, and a number of quite incorrect entries, even some for a train that did not run at all. The District Signalmen's Inspector considered this particular man reliable and knew of nothing to account for his failure.

The lineman found the sealed release intact and the block at "train on line" and the side plunger locked. Lever 35 was over; he was not sure about 34. He took a lamp and went to help the guard with his lights. He had fitted the treadle, when he removed the watertight cover, but did not open the contact chamber. Testing the circuit he got no reading; he also checked in the box correct operation by trains.

On May 6 he opened the contact chamber and examined for rust and similar tests with like results. There was no need to use a screwdriver or anything else on the contacts, and he did not. He thought he made no further electrical test after closing the chamber, and the treadle was not touched again. He made the usual short-circuit test on the block instrument soon after the accident, and when lever 34 was pulled the side plunger could not be depressed and was latched; this proved the treadle circuit open at that moment.

The next morning a train was run over the treadle and the Assistant Signal & Telecommunications Engineer made a test, which gave a leakage reading of 1 amp. for 10 to 15 min. The treadle was opened and its faulty condition found. The lineman could not explain how the bonding wire became displaced. He had not touched it. It might have been received like that. The negative tests had not caused him to look for any fault, and he had not been instructed to watch specially for displacement of this wire. He had installed a number of treadles and did not think he had ever been supervised then; nor had he received any written or verbal instructions regarding that, or maintenance either. He had not seen the manufacturers' booklet on this particular treadle. All reconditioned ones were received filled with mercury. It was not his custom to remove the contact unit to check mercury level, nor to check it a week after installation, as laid down in the booklet. The lineman showed Colonel McMullen a printed notice attached to new treadles reading "Do not remove inner contact box unless absolutely necessary."

On the day after the accident, with the Assistant Signal & Telecommunications Engineer, he examined the apparatus under the frame, and found the disconnected switch. He had to examine all split pins every three weeks and had done so about May 17. Those on lever 34 were difficult to examine, especially with the lever over, but he had felt them, and was certain they were all in position. He might miss a pin not fully open once, but, he thought, not twice. He serviced the switch in January, but had not disconnected the arm nor taken the split pin out, and could not account for it falling out. The pin and cotter pin could not have been on the floor for long, for they would, although oiled, have rusted. Except for the difficulty in examining certain split pins maintenance of the Stobcross frame was not difficult. Evidence was given by other linemen.

The District Inspector (Telegraph) was off duty at the time, and read of the accident in the evening papers, but did not telephone to find out what had happened, assuming it to be "something other than electrical." He did not go to Stobcross until the next morning and was sent to Glasgow Central to check certain controls. He did not see the treadle installed nor test the circuit through it when next at Stobcross.

He did not see the defective contact unit until Colonel McMullen's inquiry, when he could not explain how it had come to be so. He did not think he had seen this lineman installing a treadle and had not issued any instructions about either installation or maintenance. He would expect him to remove the contact chamber lid to see it was filled with mercury. When asked if this was necessary when the treadle was known to be filled, he said he did not think so. He thought the lineman had a card saying he did not have to check it. But he should, within a fortnight, remove the contact unit and check mercury level and thereafter examine every month or two.

This inspector further said he undertook a detailed examination of Stobcross frame in January, 1951, and saw or felt all cotter pins and submitted a certificate that everything was in order. He made a superficial examination on April 2, found no defect, and could not explain how the pins had dropped out. He had not known it before. Had he noticed a split pin of the size found on the floor he would have had it changed, and he could not account for the fact that six more undersized pins had been found on the levers.

The Area Assistant said that clear instructions had been given to all inspectors to be present when complicated circuits were installed and to test simple ones as soon as possible after installation. He would have expected the inspector to test this treadle to instrument circuit within 4 to 5 days; if impracticable, then when he was at Stobcross on April 2.

Inspecting Officer's Conclusions

Colonel McMullen thinks that the Stobcross signalman received a reminder from Glasgow Central about the 2.18 p.m. train and, seeing his block instrument at "train on line," forgot entirely about the excursion for which he had made no register entries, and thought he had omitted to give "out of section" for the preceding one. His statement that he heard no whistle is accepted, but there is no reason to doubt it was given. Probably he did not know what train he had accepted when the excursion was offered—it was 40 min. late—and tried unsuccessfully to find out from Glasgow Central.

Whether that was so or not, he should have known that there was *a train* in the section and not have released the block. Within half an hour he had omitted to record five block signals and to offer the excursion forward, also the colliding train, and to clear any signals for the former. He was slow in doing so for the 2.18 train and did not until he saw a fireman approaching. The times he recorded for sending "obstruction danger" also were quite wrong. A man with a good record, he gave his evidence in a straightforward manner, making no excuses. Neither he nor others could account for his lapse.

A detailed medical report showed that a break occurred in continuity of thought and action, though not in actual consciousness, and that such slight lapses possibly had occurred before. If this were the first attack, others might follow from defects in

cerebral circulation. It was considered that his state of health should preclude extension of his service. It would not be right therefore to blame the signalman for his failure. The staff of the Glasgow Operating District are normally sent for examination when they are to be re-employed after retiring and this man was the only one out of 20 signalmen not so dealt with.

The signalman on duty up to 3 p.m. at Glasgow Central was not a satisfactory witness. Although he denied it, Colonel McMullen feels sure he realised that "out of section" for the excursion was overdue and sent the routing signal for the next train as a reminder. He seemed ignorant of what special trains were running and did not go out of his way to give the Stobcross man information about trains as they passed; probably it was the relieving man who answered the telephone when the enquiry about the excursion was received. The Stobcross stationmaster should have checked the register more thoroughly and notice of this aspect of the case has been taken.

Two simultaneous danger failures allowed of the block being released. Colonel McMullen could not establish when the defect started in the treadle. Testing is most carefully done before sending away from Crewe shops and it is very unlikely that this one was defective when dispatched. The conclusion is that the bonding wire became displaced by the lineman when examining the contact chamber in May; if so, the fault was not present when the inspector ought to have tested the circuit. Its intermittent nature was probably due to vibration set up by passing trains and overhead traffic, accounting for the negative reading when the original tests were made. No doubt the cotter came from the round pin and fell out only a short time before. Neither inspector nor lineman noticed its jaws were not properly open, or that it was too small. After the accident at Glasgow Cross in 1949 (see *The Railway Gazette* of November 18, 1949) special instructions regarding maintenance on the low level lines were issued, requiring inspectors to check all split pins carefully, and yet this inspector signed a certificate of detailed examination in January, 1951, that the Stobcross frame was in order. These failures reflect most adversely on the maintenance of this section and it is difficult to excuse the inspector.

He might have noticed that the timber casing prevented the disconnected switch arm from falling right down. He gave no guidance to his linemen on treadle installation and maintenance, on which there is divergence of views among the staff. His indifference to these matters is the more regrettable because he had to be reprimanded after the earlier accident.

The lineman acted promptly and with initiative after the collision, but the inspector appeared to take little interest in it, and when he read about it did not even telephone. It could not have been prevented by any member of either train crew, but its circumstances were rendered more unpleasant by the occupied coaches being unlighted.

Remarks and Recommendations

The Stobcross signalman should not have been permitted to work in a signal-box, but the omission to examine him medically was an isolated case of which suitable notice has been taken. His condition must have obtained for some years and to safeguard the public, men doing duty of this kind should undergo thorough examination at a certain age, as already in the case of men who served with some of the former railway companies. It is recommend to standardise this throughout British Railways.

The failure of electrical equipment is attributable to nothing but bad maintenance. The instructions issued after the Glasgow Cross accident have been repeated and amplified. It is to be hoped this will have the desired result. The treadle fault was unusual, and Colonel McMullen can find no previous example of it.

In the latest type a bakelite hood is being fitted over the bonding wire, an improvement when re-designing to suit the more exacting Southern Region requirements. (This was not introduced as a result of any previous occurrence of this nature.) Instructions have been issued that until these new type contact units can be fitted, the bonding wires are to be covered with insulating material.

The lock-and-block arrangements, although old-fashioned, have undoubtedly done much to ensure safety on this busy underground section, but did not prevent the Glasgow Cross accident of 1949, nor a serious one at Stobcross itself in 1939. Circumstances in each case were different, but those accidents might have been averted had there been colour-light signals, and continuous track circuiting would have prevented the present one. A comprehensive modernisation scheme has been prepared, the work to start in 1953, but in view of the very difficult working conditions it is recommended to do so with the least possible delay.

Staff & Labour Matters

Railway Shopmen's Wage Claim

No agreement has yet been reached in the claim by railway shopmen. As the result of the impasse reached at the Railway Shopmen's National Council the matter was referred by the employees' side of the council to the Minister of Labour & National Service, and discussions took place between representatives of the Railway Executive, the N.U.R. and the Confederation of Shipbuilding & Engineering Unions and Sir Robert Gould and other officers of the Ministry. The N.U.R. has intimated its acceptance of the Railway Executive offer of an increase of 8 per cent. in wages for railway shopmen, in line with the increase awarded by the Railway Staff National Tribunal to railway conciliation and salaried staff. The C.S.E.U. has not accepted this offer and the question of further action to be taken is under consideration.

Exceptional Position of Railway Shopmen

An article in *The Railway Review* of January 25 states that railway shopmen are again unable to benefit from a wage increase received by workers in other sections of the railway industry because they are covered by separate negotiating machinery, and represented in part by unions other than those which specifically cater for the workers in the railway industry. Reference is made to the obstructive attitude of the C.S.E.U. in connection with the N.U.R. claim for an increase of 12s. 6d. a week for all railway workers, which was subsequently modified to 10s. a week and was dealt with at the 1949 Board of Conciliation.

Commenting on the delay in reaching agreement on their more recent claim on behalf of shopmen the article points out that it is now five months since the date the increase of 8 per cent. could have operated, and "if the present tempo in increasing living costs continues, further claims will be necessary before we obtain any benefit from the present one." It is contended that the rank and file of shopmen recognise that their bargaining strength is in the existence, policy, and determination of the vast bulk of railwaymen in goods and passenger stations, on the footplate and in the signal boxes, and on the permanent way; it is to them that shopmen look for an indication of what is likely to come their way in the form of improvements in wages and conditions, not to the outside engineering industry.

By far the most important consideration for shopmen, it is said, is that passenger and goods traffic maintains the industry—the only means by which locomotives, carriages, and wagons continue to be necessary.

Women Engineering Workers' Pay

Women workers aged 18 and over in the engineering industry are to receive a wage increase of 10s. 1d. under an award by the Industrial Disputes Tribunal, published earlier this week. The new rates apply from the first pay week after November 23, 1951, when men engineering workers received an advance of 11s. a week.

The unions concerned hoped to obtain the same increase for women workers, but the tribunal award is substantially the same as an offer by the employers. More than 400,000 women are understood to be affected by the increases.

BRITISH STANDARD FOR TOROIDAL SEALING RINGS.—This British Standard (B.S. 1806: 1951) was prepared at the request of the Ministry of Defence and applies to the dimensions of toroidal sealing rings used as packings for reciprocating mechanisms and as gaskets for static purposes for light and medium general engineering applications. These rings are not intended for use at pressures in excess of 1,500 lb. per sq. in. For use as packings on reciprocating mechanisms 73 sizes are specified in the range of $\frac{1}{8}$ in. to 8 in. and for static purposes 96 sizes in the range of $\frac{1}{8}$ in. to $15\frac{1}{2}$ in. The standard emphasises the necessity for close collaboration between designer and manufacturer in order to ensure satisfactory operation and service. Copies may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1. Price 2s. 6d.

WESTERN REGION STATION GARDENS.—Prizes have been awarded to 227 successful entrants from among nearly 400 received for the 1951 station gardens competition organised by the Western Region of British Railways. Special prizes, awarded annually for the best-kept station garden in each district, have been won by Shiplake, Yatton, Langport West, Totnes, Rhymney Bridge, Resolven, Moreton-in-Marsh, Stratford-upon-Avon, Ludlow, and Llynclys. In the Gloucester district, first prizes were awarded to Awre Junction, Cricklade, Symonds Yat, and Cheltenham South & Leckhampton, and to Peterston in the Cardiff District. Hanging flower baskets secured prizes for Collingbourne, Newport High Street, Nelson & Llancaiach, Fishguard Harbour, Swansea High Street, Llandilo, Church Stretton, Pwllheli, Penychain, and Criccieth.

Permanent Way Institution Annual Meeting and Dinner

Mr. John Elliot on the needs of the permanent way and the important work completed despite shortage of staff

The sixty-eighth annual winter meeting of the Permanent Way Institution was held at the Institution of Civil Engineers on January 26. The President, Lt.-Colonel H. B. Everard, was in the chair. Over 150 members attended from all parts of the country, including past-Presidents Messrs. J. Taylor Thompson, V. A. M. Robertson, and F. E. Harrison. Mr. A. S. Quartermain, President of the Institution of Civil Engineers, and Mr. J. L. A. Cuperus, Chief Civil Engineer, Netherlands Railways, were also present.

The Secretary, Mr. H. Janes, submitted a report of the activities of the Institution during the past year, in the course of which it was stated that in January, 1951, Lt.-Colonel H. B. Everard had accepted the presidency, and during the past year had visited many sections. His active interest had done much to help recruitment of members during the present difficult time in regard to staff shortage in the civil engineering department. Thanks were also due to Mr. J. A. R. Turner, London Section, for the arrangements which were made for the annual winter dinner of 1951.

During the year over 200 meetings and visits had taken place by home sections. In some cases joint meetings were arranged, and on September 8, 1951, the London Section paid a visit to Dublin to participate in a meeting of the Irish Section. The sections in India and the Sudan had held several meetings and the first postwar general meeting of the Malayan Section took place at Kuala Lumpur on April 28.

Several meetings of the new Rhodesia Section had taken place. On March 16 a meeting was convened at Salisbury, Southern Rhodesia, when it was decided to form a section of the Institution. The General Manager of the Rhodesia Railways, Sir Arthur Griffin, had given his support to the project, and the Chief Engineer, Mr. B. H. Johnson, welcomed the proposal. Membership of the section now exceeded 140.

The enrolment of members in 1951 was an improvement on the previous year. The total elected was 547, and this was a very satisfactory number having regard to the reduced manpower of the civil engineering staff.

Election of President

Mr. V. A. M. Robertson then proposed the re-election as President of Lt.-Colonel H. B. Everard, Chief Officer, Engineering (Maintenance), Railway Executive. Mr. Robertson said that from his own experience he knew that Colonel Everard had great interest in the well-being of the Institution, and its affairs had been very much in his thoughts during the past twelve months. The proposal was seconded by Mr. F. E. Harrison and carried with applause. Colonel Everard, replying, said that he had visited many sections during 1951, and he would try to visit the remainder during the present year.

The following were elected as Vice-Presidents:—For England, Mr. F. Wensley; Scotland, Mr. W. Paterson; Wales, Mr. J. Cunningham; Ireland, Mr. T. R. Leonard; Rhodesia, Mr. B. H. Johnson; Sudan, Mr. J. P. H. Stein.

The officers were re-elected, namely:—Secretary, Mr. H. Janes; Treasurer, Mr. F. Lawson; Editor, Mr. H. Ormiston; Auditors, Messrs. Hector Hall and L. T. Starks.

After members of the council and various committees had been elected, Mr. S. A. Strange gave a report regarding the 1952 summer meeting and convention to be held in East Anglia, with headquarters at Ipswich, from June 14 to 19. Visits will be made to engineering works at Ipswich, Norwich, and Colchester, and during the week a civic reception will take place at Christchurch Park Mansion by the Mayor and Mayoress of Ipswich. During the visit to Colchester a reception will be given at the Moot Hall by the Mayor.

At the conclusion of the business meeting, the Secretary, Mr. H. Janes, gave a review on "Forty Years as Corresponding & General Secretary of the Permanent Way Institution." Mr. Janes gave some particulars of the more important events in the progress of the Institution since 1912, when he first held an official position, having then been elected Corresponding Secretary to the London Section. The past 40 years were dealt with in ten-year periods. To illustrate the talk a film of the summer meetings of the Institution in Scotland, 1935, and Germany, 1938, and lantern slides of the Netherlands, 1951, were shown.

Mr. J. L. A. Cuperus proposed a vote of thanks to Mr. Janes for his address. They had heard a great deal of the history of the Institution from which they could gather an idea of the work the Secretary had done during many years. Lt.-Colonel D. R. Bennett seconded the vote of thanks.

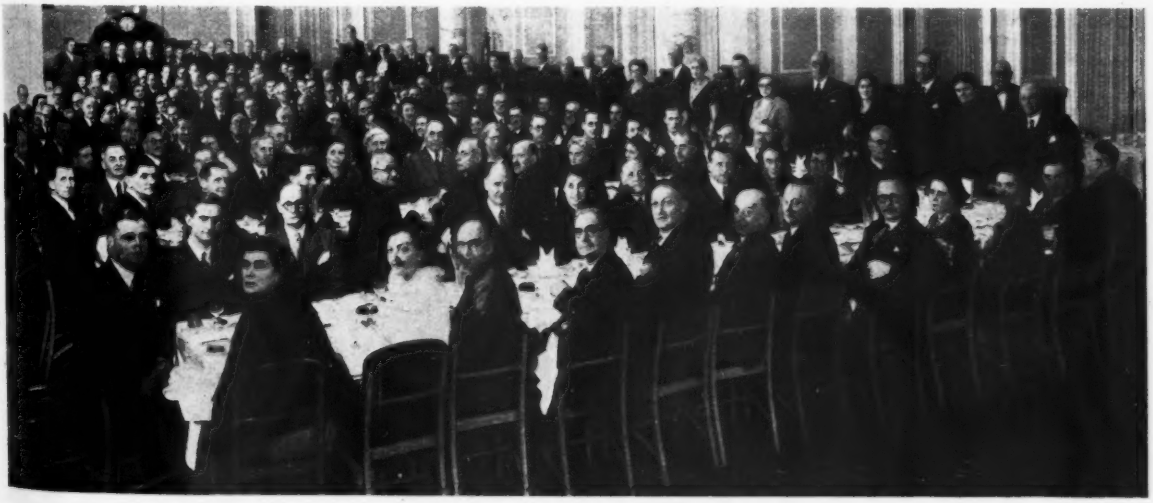
Annual Dinner

The annual dinner of the Institution was held at Railway Executive headquarters, 222, Marylebone Road, London, N.W.1, when the President, Lt.-Colonel H. B. Everard, was in the chair. The principal guests were Mr. John Elliot, Chairman, Railway Executive; Lord Latham, Chairman, London Transport Executive; Mr. F. Q. den Hollander, President, Netherlands Railways, and Mr. J. L. A. Cuperus.

Among those present were:—

Messrs. W. J. Ash, R. W. Bailey, G. W. Baker, G. B. Barton, W. H. Best, E. E. Blick, W. T. Bowen, E. Boreham, J. I. Campbell, J. A. Carey, T. A. Carson, C. J. Chaplin, B. W. C. Cooke, E. C. Cookson, J. Cunningham, J. L. A. Cuperus, H. Eagers, R. A. Edwards, F. E. Garnett, A. H. Grainger, F. E. Harrison, D. Herlihy, H. Janes, F. E. Japes, W. W. Johns, F. Lawson, A. C. Maber, A. C. Meyrick, C. F. Minett, D. Minett, S. Newman, H. Ormiston, W. Paterson, A. S. Quartermaine, J. Ratter, V. A. M. Robertson, W. Rothwell, M. G. R. Smith, S. A. Strange, N. W. Swinnerton, J. Taylor Thompson, J. A. R. Turner, E. H. Tustain, F. Wensley, D. G. Williams, and W. Young.

Mr. John Elliot, Chairman of the Railway Executive, proposing the toast of the Permanent Way Institution, first expressed his pleasure at the opportunity of meeting Mr. F. Q. den Hollander, President of the Netherlands Railways. British Railways,



Group taken at the annual dinner of the Permanent Way Institution on January 26

and indeed the country as a whole, had no greater friend than this accredited representative of Holland, and this friendship could not be better illustrated than by the fact that Mr. and Mrs. den Hollander were present at this annual dinner.

The problems met with in keeping the permanent way of British Railways up to the required standard in face of a serious shortage of men was causing great anxiety to everyone. Those who had to read the reports were, however, aware of the great work being done, and he wished the public as a whole could realise this. In general the condition of the permanent way was pretty good, and there were indications that the worst had been reached, and that an upward turn had begun.

Steel Cuts

The Railway Executive had adopted a policy in regard to the cut in steel, namely, that the blow should fall lightest on the permanent way. If the cuts which the Government had advised were to be applied to British Railways were, in fact, applied, then the results this year and next would be serious for all those requirements in which steel was the basic material. Even so, the needs of the permanent way would have to be met, so that at the worst there would be relaid that number of miles of track regarded as the minimum for reasonable maintenance.

Mr. Elliot said that British Railways needed faith in itself. More goodwill with more laughs and fewer sneers would also be a good thing. As British Railways and the Permanent Way Institution gathered strength it would be found that the work done in the past few years would bear fruit and help to make the railways what all present wanted them to be.

Lt.-Colonel H. B. Everard, responding, remarked that this was the first time the Chairman of the Railway Executive had been present at an annual winter dinner. During the past year he had followed, as President, the custom of visiting as many as possible of the sections and had invariably found a spirit of enthusiasm which augered well for the future. Well-attended meetings and excellent speeches on varied subjects had convinced him that all was well with the local sections.

Having referred to the annual convention, and having thanked Mr. and Mrs. den Hollander and Mr. and Mrs. Cuperus for the great contribution they had made towards its success last year, the President welcomed Mr. S. Williams, President of the Institution of Railway Signal Engineers, as a symbol of the close co-operation existing between the two Institutions. The presence of Lord Latham, Chairman of the London Transport Executive, was also appreciated.

Mr. J. C. L. Train, Member of the Railway Executive and past-President of the Institution, proposing the toast of the Netherlands Railways, said that a great deal of interesting work had been seen by the members in Holland on the railways and in connection with reclamation work, and those privileged to take part in the visit were impressed by the skill of the Dutch people. The great progress the Netherlands Railways had made since the war, with the electrification of tracks, their fine stations, and their architecture generally, was such that they were to be envied in every way.

Mr. A. W. M. Dyke, Member of the South Wales Section, proposed the toast of the guests, to which Lord Latham responded.

Contracts & Tenders

Group Marketing (Overseas) Limited has recently obtained a substantial order from Schindler Waggon A.G., Pratteln, Switzerland, for seating to be manufactured by Trimwell Products Limited, Bridgend, Glamorgan. The seating will be used in carriages under construction for Mexico.

Reference to a call for tenders for the construction of a railway from Guija to the Rhodesian Frontier, which was issued by the Directorate of Ports, Railways & Transport of the Province of Mozambique was made in our November 16, 1951 issue. According to the Board of Trade Special Register Information Service, the British Embassy at Lisbon has reported that this call for tenders was published in the Official Bulletin of Mozambique of December 3, 1951 (not November 3 as previously stated), from which date the period of 90 days for the submission of tenders should be counted.

According to a further report by the Board of Trade Special Register Information Service, the closing date for the receipt of tenders for electrification of the Santa Maria-Cruz Alta line, Rio Grande Do Sul Railway, Brazil, has now been postponed from March 21 to May 21. The tender was referred to in our November 16, 1951, and January 18 issues.

The Board of Trade, Commercial Relations & Exports Department, Special Register Information Service recently included a report from Johannesburg that the South African Railways are inviting tenders for the supply and delivery of designs necessary for the building of lightweight all-metal coaches. The closing date of the tender (No. B. 4033) is May 8.

Tender forms and relevant drawings may be inspected at the Office of the Chief Stores Superintendent, South African Railways, Johannesburg.

A further report from South Africa quoted by the Board of Trade Special Register Information Service, states that the South African Railways have issued a call for tenders for the following electrical signalling material:—

Two hand generators, in accordance with the S.A.R. provisional specification of October 12, 1951.

Eleven point machines for hand generator operation, in accordance with S.A.R. specification No. 17 C.

Four interlocked circuit controllers, with handcranks for the point machines.

Eleven neutral polar d.c. relays for use with the hand generator for controlling the operation of point machines.

Tenders must reach the Chairman of the Tender Board before 9 a.m. on February 21. A copy of the tender documents is available for inspection by United Kingdom manufacturers at the Board of Trade, Commercial Relations & Exports Department, Horse Guards Avenue, London, S.W.1.

Notes and News

Peruvian Corporation Limited.—Applications are invited for the post of civil engineering draughtsman, between 25 and 30 years of age, required by the Southern Railway of Peru. See Official Notices on page 139.

Vacancies for Design Engineers and Draughtsmen.—Senior and junior design engineers and draughtsmen are required in London for work on the electrical and mechanical design of traction motors, generators, and control equipment for diesel-electric locomotives. See Official Notices on page 139.

Railway Students' Association.—At a meeting of the Railway Students' Association, to be held at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6 p.m. on February 13, Mr. T. H. Hollingsworth, Commercial Superintendent, Scottish Region, will read a paper on "The Changing Pattern of Railway Transport."

Watford-Rickmansworth Service to be Withdrawn.—The passenger train service between Watford Junction and Rickmansworth Church Street in the London Midland Region will be withdrawn as from March 3. Parcels and passenger train merchandise will be dealt with at the London Transport station at Rickmansworth and alternative services for passengers will be provided by buses.

Withdrawal of Last L.M.R. 0-8-4 Freight Tank Locomotive.—The last 0-8-4 tank locomotive, No. 47931, of the London Midland Region was withdrawn on December 15. The engine was one of 30 designed for the L.N.W.R. in 1921, but the prototype was not built until after the Grouping. They were intended for heavy goods

London Midland Region 0-8-4 *tank locomotive No.* 47931, *now withdrawn*

OFFICIAL NOTICES

SENIOR & Junior design engineers and draughtsmen required in London for work on the electrical and mechanical design of traction motors, generators, and control equipment for diesel electric locomotives. Men with first class experience in traction work are required for the senior posts. Good salaries will be paid, and there is a generous staff assurance scheme. Please apply with full details of training, experience, age, etc., to Box 369, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

DRAUGHTSMEN required. 5-day week. Pension Scheme in operation. Apply GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, Gloucester.

RAILWAY SIGNALLING AND COMMUNICATIONS INSTALLATION AND MAINTENANCE. A practical guide, especially intended to help Signal Inspectors, Installers, Fitters, Linesmen, Draughtsmen, and all concerned with installing and maintaining Signal, Telegraph, and Telephone Equipment. 416 pp. Many illustrations. Cloth. 8s. By post 8s. 6d. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

GRADUATE Electrical Engineers required to be trained as Designers of electrical equipment for diesel-electric locomotives. Practical workshop experience of manufacture and testing of this equipment preferred, together with good Honours Degree in Electrical Engineering. Age range 25-30 years. Good salary, prospects and facilities for advanced technical education. Excellent working conditions. Please reply in confidence to Box 351, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

WE buy used or unserviceable Steel Files at good prices on lots of 2 cwt. or more.—THOS. W. WARD LTD., Reusable Steel Dept., Albion Works, Sheffield.

RAILWAY MAINTENANCE PROBLEMS. By H. A. Hull (late District Engineer, L.M.S.R.). Valuable information. With much sound advice upon the upkeep of permanent way. Cloth. 8½ in. by 5½ in. 82 pp. Diagrams. 5s. By post 5s. 3d. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE PERUVIAN CORPORATION LIMITED — CIVIL ENGINEERING DRAUGHTSMAN for Southern Railway of Peru, age 25 to 30. Knowledge of instrument work, design of reinforced concrete and steel constructions and some practical experience. Duties not confined to drawing office. Scope for energetic worker. Apply to the Secretary, 144, Leadenhall Street, London, E.C.3.

BOUND VOLUMES.—We can arrange for readers' copies to be bound in full cloth at a charge of 25s. per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press Limited, 33, Tothill Street, London, S.W.1.

JUST PUBLISHED.—Twenty-Five Years of the North Eastern Railway, 1898-1922. By R. Bell, C.B.E., Assistant General Manager, N.E.R. and L.N.E.R. Companies, 1922-1943. Full cloth. Cr. 8vo. 87 pages. 10s. 6d.—*The Railway Gazette*, 33, Tothill Street, London, S.W.1.

and passenger work in the Abergavenny and Tredegar district. Some were later transferred to the Swansea, Llandovery, Buxton, and Edge Hill areas for heavy freight work, and more recently the remaining few members of the class ended their working life at Edge Hill on shunting duties. The first engine to be withdrawn was No. 7947, in 1944. Two were eventually renumbered into the British Railways series, one No. 47931 and the other No. 47937; the remainder still carried the original numbers on withdrawal.

Special Wagons for Iron-Ore Traffic.—An article in our issue of January 18, dealing with the power-operated discharge wagons designed by British Railways for iron-ore traffic, referred to the limited room available for accommodating the door engines, resulting in reduced accessibility for lubrication, and to the provision of special bushes and sleeves to meet this contingency. These sintered metal products are made by the Morgan Crucible Co. Ltd. under the name Reservoil—not Preservoil as stated in the article.

Railway Benevolent Institution.—At a meeting on January 24 the board of the Railway Benevolent Institution granted annuities to 12 widows and eight members involving an additional liability of £338 14s. a year; 44 gratuities were also granted amounting to £432 7s. to meet cases of immediate necessity. Grants from the casualty fund during December, 1951, amounted to £524 6s.

Ambitious Venture for L.M.R. Dramatic Society.—As part of its ambitious policy in amateur dramatics, the British Railways (London Midland Region) London Dramatic Society is to produce three one-act plays at the Chepstow Theatre Club, Bayswater, London, W.2, between February 20 and 23. The plays chosen show the versatility now animating the Society, for they will include "Ophelia" by T. B. Morris, "Postal Orders" by Roland Pertwee, and "The Fourpenny Box" by Ian Hay, thus giving drama, comedy, and farce all in one bill.

British Railways Amateur Boxing.—More than 300 entries have been received from railwaymen in all parts of the country for the British Railways fourth annual amateur boxing championships. Regional eliminating bouts started with contests in the Scottish Region at Glasgow on January 19, while in February those of the other Regions will be staged at Clapham, Southall, Crewe, Horwich, Doncaster, and York. The quarter-finals will be held at Cardiff and Liverpool in March. The semi-finals in seven of the ten weights will be held at York in April, and those in the remaining three weights will be fought out when the finals are contested at the Royal Albert Hall, London, on April 18. There were 286 competitors last year.

Great Northern Railway (Ireland).—The board of Great Northern Railway Company (Ireland) states that the results for 1951 do not allow of the payment of any dividends on the guaranteed preference or ordinary stocks. No payments were made on the three stocks for 1949 and 1950. The last ordinary dividend was 1 per cent. for 1947.

North Eastern Region Football Specials.—For the fourth round of the F.A. Cup to be played tomorrow, February 2, the North Eastern Region of British Railways has arranged eight special trains to take Newcastle United supporters to London for the match with Tottenham Hotspur, and six to transport Hull City supporters to Blackburn.

British Railways Coal and Steel Carryings.—British Railways moved 375,820 tons of coal from deep-mine pits and opencast sites during the 48 hr. ended 6 a.m. on January 28; this makes a total of 3,177,790 tons for the week. The latest figures for iron and steel show that 194,289 tons were conveyed from principal steelworks during the week ended January 19.

Effect of Reduced Travel Allowance.—Details of the reduction of the basic travel allowance announced on January 29 by the Chancellor of the Exchequer, Mr. R. A. Butler, have been issued by the Treasury. The allowance is reduced forthwith to £25 a head for adults; the allowance for children under 15 is £15. The previous arrangements allowing larger amounts of currency for travel in Denmark, Norway, and Sweden no longer apply. Travellers to these countries are entitled only to the standard amounts. Only the cost of the fare to the destination and back by a normal direct route may be paid for in sterling. It is no longer possible to pay in sterling for circular tours on the Continent, part or all of the cost of which will have to be met from the £25 allowance.

Cable & Wireless (Holding) Limited.—The directors of Cable & Wireless (Holding) Limited announce that the profit for 1951, before tax payment, amounted to £541,000 against £369,000. The latter figure for 1950 was arrived at after deducting £461,000 gross for the final dividend on the preference stock repaid on June 30, 1950. After taxes of £216,000, against £187,000, the profit is £325,000, against £182,000. General reserve receives £100,000 (nil), excluding in 1950 an amount of £935,000 transferred out of profits brought forward from previous years. The ordinary dividend is maintained at 6 per cent., and in addition there is a bonus of 2 per cent. During the year £2,291,632 of 3 per cent. 3½ year unsecured loan stock has been redeemed, which has necessitated the realisation of investments, and the book value of the quoted investments shows a reduction from £12,840,118 to £11,202,668.

French Fares Raised.—French railway fares were increased by 25 per cent. on January 28. The increase makes travel 17·2 times as expensive as in 1938.

Western Region, London Lecture & Debating Society.—Mr. E. Havers, Assistant to Commercial Superintendent (Mineral), Western Region, will read a paper on "The Coal Industry and the Western Region" at a meeting of British Railways, Western Region, London Lecture & Debating Society, to be held in the Clerks' Dining Club, Paddington, W.2, at 5.45 p.m., on February 14.

Second Western Region Gas-Turbine Locomotive.—The 3,000-h.p. gas-turbine electric locomotive No. 18100 built for British Railways by the Metropolitan-Vickers Electrical Co. Ltd. was inspected at Paddington Station, Western Region, on January 29. Among those present were:—

Lord Hurcomb, Chairman, Lord Rusholme, Sir William Valentine Wood, Mr. F. A. Pope, Members, British Transport Commission; Mr. S. B. Taylor, Chief Secretary to the British Transport Commission; Messrs. John Elliot, Chairman, R. A. Riddles, J. C. L. Train, V. M. Barrington-Ward, Members, Railway Executive; Sir James Milne, formerly General Manager, Great Western Railway; Mr. F. W. Hawksworth, formerly Chief Mechanical Engineer, Western Region; Messrs. D. MacArthur, Director and General Sales Manager, N. Elce, Director and Chief Engineer, Mechanical Department, Dr. D. F. Smith, Chief Engineer, Gas-Turbine Department, Metropolitan-Vickers Electrical Co. Ltd.; Messrs. C. K. Bird, Chief Regional Officer, Eastern Region; J. W. Watkins, Chief Regional Officer, London Midland Region; K. W. C. Grand, Chief Regional Officer, Western Region.

Jonas Woodhead & Sons Ltd.—The consolidated net profit of Jonas Woodhead & Sons Ltd., for the year ended September 30, 1951, amounted to £167,778, against £88,753, of which tax absorbed £87,221, against £35,581. With £49,322 (£35,301) brought in and a surplus tax provision of £6,700 (nil), the group had a

total of £136,523 (£88,199) available for appropriation. Transfers to general reserve are £30,000, against nothing, and the proposed dividend of 15 per cent., which compares with 10 per cent. for the previous twelve months, plus a bonus of 5 per cent., requires £36,914. There remains £69,609 to be carried forward.

Institute of Transport Annual Dinner.—Viscount Runciman of Doxford and Mr. Herbert Morrison have accepted invitations to speak at the Annual Dinner of the Institute of Transport, which will be held on Friday, March 21, at 7 for 7.30 p.m., at the Connaught Rooms, Great Queen Street, W.C.2. The dinner will be followed by dancing.

Forthcoming Meetings

February 1 (*Fri.*).—Institute of Transport, Northern Ireland Section, at the Midland Hotel, Belfast, at 6.45 p.m. Annual Dinner and visit of President.

February 2 (*Sat.*).—Historical Model Railway Society, at the headquarters of the Stephenson Locomotive Society, 32, Russell Road, W.14, at 3 p.m. "More Railway Reminiscences," by Mr. J. N. Maskelyne.

February 4 (*Mon.*).—Institute of Transport, Metropolitan Section, at 80, Portland Place, W.1, at 5.30 for 6 p.m. Symposium on "Railway Transport in the U.S.A.," by Mr. A. Dean (Engineering), Mr. F. Gilbert (Labour), Mr. S. G. Hearn (Operating) and Mr. A. C. B. Pickford (Commercial).

February 4 (*Mon.*).—Society of Engineers, in the apartments of the Geological Society, Burlington House, W.1, at 5.30 p.m. Presidential Address, by Mr. R. S. V. Barber.

February 5 (*Tue.*).—Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 5.30 p.m. "Some Recent Experience in Composite Pre-Cast and In-Situ Concrete Construction, with Special Reference to Pre-Stressing," by Mr. F. J. Samuely.

February 5 (*Tue.*).—Permanent Way Institution, Leeds Section, at the Leeds Church Institute, Albion Place, Leeds 1, at 7 p.m. "Renewal of Wiske Moor Water Troughs," by Mr. H. Eagers.

February 6 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, Storey's Gate, S.W.1, at 5.30 p.m. Informal discussion on passenger comfort on modern coaching stock.

February 6 (*Wed.*).—Institution of Railway Signal Engineers, at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6 p.m. "Modern Developments in Signalling and their Application on the Eastern Bengal Railway, Pakistan," by Mr. H. F. Dennison.

February 7 (*Thu.*).—British Railways, Southern Region, Lecture & Debating Society, joint meeting with British Railways, Western Region, London Lecture & Debating Society at the Chapter House, London Bridge, at 5.45 p.m. Debate: "That the Inter-Regional Transfer of Staff is Beneficial, and should be Encouraged."

February 11 (*Mon.*).—Institute of Transport, at the Jarvis Hall, 66, Portland Place, W.1, at 5.45 p.m. Brancker Memorial Lecture: "The Flying Boat and its Place in Aviation," by Air-Chief Marshal Sir Frederick Bowhill.

Railway Stock Market

As was to be expected, plans put forward by Mr. Butler for dealing with inflation and the drain on gold and dollar reserves have been the chief topic of conversation in the City. Drastic measures were expected, and stock markets, which invariably attempt to look ahead, had been marking down prices of industrial shares in recent weeks. Consequently prices had already discounted the proposals, and, although further adjustments must be expected, there is a tendency at the time of writing for share prices to rally in some directions. This is apparent particularly in the engineering and allied sections, which had recently been marked down, although in most cases it is believed that profits should benefit from rearmament work. Higher dividends can hardly be expected, because of the effect of E.P.T., full details of which are to be announced in April. It seems that most companies prominent in rearmament and kindred work have favourable prospects of being able to keep dividends, and on this basis yields at current prices seem attractive. Shares of companies connected with the home market are out of favour because many will face a difficult year owing to shortages and a downtrend in the spending power of the public. On the other hand, the tendency is for British Funds to strengthen in the belief that the moves against inflation and for improving British credit abroad should benefit sentiment in this market in due course.

Overseas securities again attracted a good deal of attention, among which German and Japanese bonds, and also Canadian issues, have been prominent. Foreign rails were also fairly active, although best levels have not been maintained. There was again a good deal of business in Antofagasta ordinary and preference in the belief that a favourable trend in traffic receipts is likely to continue and that this year payments in respect of preference dividend arrears may be speeded up. Taltal shares were good with a sharp jump to 19s. 6d. on hopes that the railway may be able to increase charges. Nitrate Rails shares were 23s. 3d. San Paulo 10s. units eased to 14s. 6d. and Brazil Rail bonds were quoted at 5⅞.

Canadian Pacifics remained active, but at $71¾ have not kept best levels; the 4 per cent. debentures were 80¼ and the 4 per cent. preference 65. Leopoldina stocks kept firmly held in the belief that their total pay-outs will exceed current market prices. The 6½ per cent. debentures were 150¼. The preference stock, which may well receive a total pay-out of over 30, was quoted at 28¾ and the ordinary stock at 11⅛. The ordinary stock may receive in all repayments amounting to £12 or even £13, according to market hopes. Holders have every reason not to sell at this stage. There has been a sharp fall in Leopoldina Terminal 5 per cent. debentures to 108½ and the ordinary shares have fallen to 10½d. on the scheme of arrangement involving liquidation. Including the cash repayment under the Leopoldina Railway pay-out and the first distribution under its own liquidation scheme, Leopoldina Terminal debentures are worth rather more than the current price of the stock. If all goes well over the next 5½ years, and assuming Brazil exchange and taxation remains around current levels, holders of the debentures would receive further payments totalling £37½ gross. The ordinary shares should have a repayment of 6d. during the next few months and could receive about another 1s. 8d. a share if all goes well over the next 5½ years. The scheme is an ingenious one to meet a complicated situation. If it does not go through, the directors emphasise there would probably be nothing additional for the debentures, and nothing at all for ordinary shareholders.

Manila "A" debentures have been steady at 71, and the preference shares 7s., but Mexican Central "A" debentures receded to 84. United of Havana 1906 debentures became more active around 17½. Road transport shares showed little change, with Southdown at 96s., West Riding 41s., and Lancashire Transport 51s. 6d. B.E.T. deferred stock declined to £400.

Engineering shares steadied with Guest Keen at 50s. 3d., Vickers 43s. 6d., and T. W. Ward 70s. 6d. and B.S.A. 32s. 3d. Among locomotive builders and engineers, Hurst Nelson came back to 55s. at Glasgow, and Birmingham Carriage were 33s. 6d. Beyer Peacock were 31s. 9d., Gloucester Wagon 13s. 3d., North British Locomotive 16s. 1½d., and Vulcan Foundry 22s. 3d. Wagon Repairs 5s. shares strengthened to 10s. 3d. Charles Roberts were 20s. 3d.

Traffic Table of Overseas and Foreign Railways

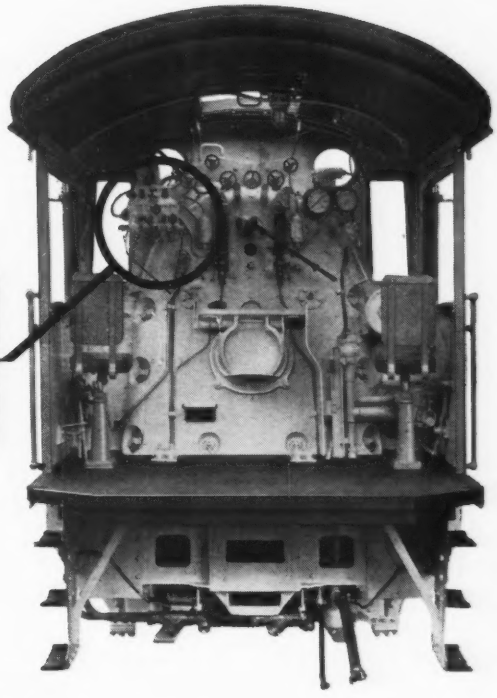
	Railway	Miles open	Week ended	Traffics for week: Total this year	Traffics for week: Inc. or dec. compared with 1949/50	No. of week	Aggregate traffics to date: Total 1950/51	Aggregate traffics to date: Increase or decrease
				£	£		£	£
South & Cen. America	Antofagasta ...	811	18.1.52	152,740	+ 37,570	3	374,000	+ 80,610
	Costa Rica ...	281	Dec., 1951	c1,313,267	+ c429,807	26	c7,260,673	+ c1,079,944
	Dorada	70	Nov., 1951	33,765	— 3,207	48	394,882	— 33,323
	Inter. Ctl. Amer....	794	Nov., 1951	$1,039,455	— $19,932	48	$11,978,007	— $282,812
	Paraguay Cent. ...	274	28.12.51	G289,547	+ G102,688	26	G8,823,911	+ G3,556,978
	Peru Corp. ...	1,050	Dec., 1951	$8,471,000	+ $1,124,000	26	$49,271,000	+ $3,141,000
	" (Bolivian Section)	66	Dec., 1951	Bs.19,282,000	+ Bs.5,954,000	26	Bs.95,087,000	+ Bs.25,173,000
	Salvador	100	Oct., 1951	c114,000	+ c27,000	18	c495,000	+ c140,000
	Taltal	147	Dec., 1951	$2,157,000	+ $721,900	26	$12,277,000	+ $3,020,200
Canada	Canadian National†	23,473	Nov., 1951	18,035,000	+ 403,000	48	190,178,000	+ 22,295,000
	Canadian Pacific† ...	17,037	Nov., 1951	12,638,000	+ 938,000	48	131,106,000	+ 16,187,000
Various	Barsi Light* ...	167	Nov., 1951	37,957	+ 6,607	33	284,050	+ 48,667
	Egyptian Delta ...	607	10.4.51	17,513	— 267	4	17,513	— 267
	Gold Coast ...	536	Nov., 1951	347,307	+ 38,503	34	2,095,480	+ 135,872
	Mid. of W. Australia	277	Nov., 1951	62,093	+ 22,023	22	304,756	+ 111,372
	South Africa ...	13,398	5.1.52	1,651,726	+ 120,221	40	76,285,611	+ 7,998,012
	Victoria	4,744	Oct., 1951	2,172,730	+ 1,149,080	17	—	—

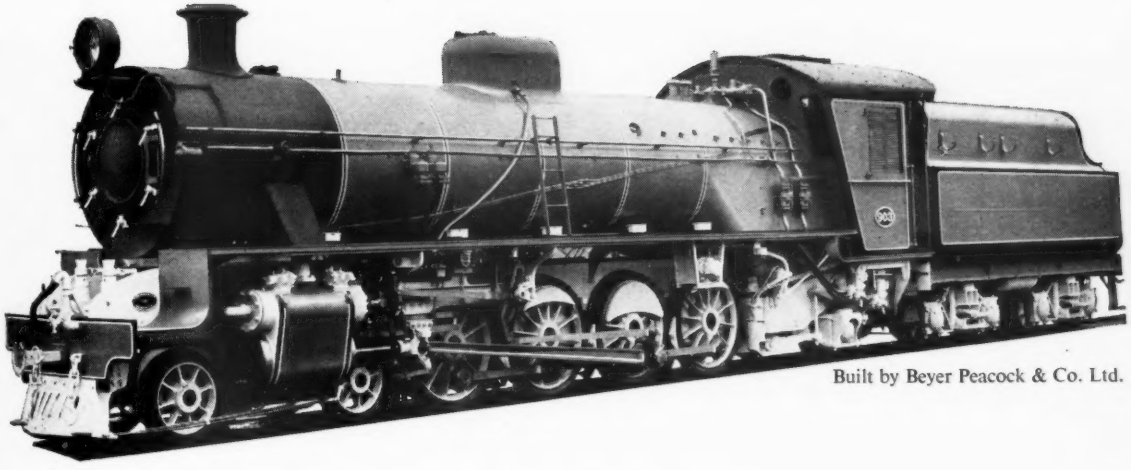
* Receipts are calculated at 1s. 6d. to the rupee † Calculated at $3 to £1

Western Australia Government Railways

fit WAKEFIELD Hydrostatic Lubricators

to 60 new "W" class locomotives





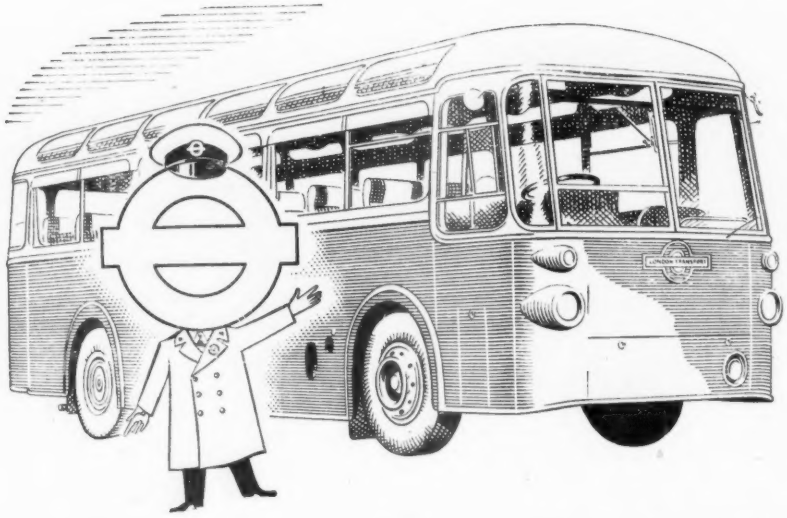
Built by Beyer Peacock & Co. Ltd.

Yet another world railway to use locomotives fitted with Wakefield lubricators — because they have proved reliable under the most extreme operating conditions. This efficiency is the direct result of over half a century of actual railway experience — the reason why, today, Wakefield Lubricators lead the world.

WAKEFIELD LUBRICATORS
MECHANICAL AND HYDROSTATIC

C. C. WAKEFIELD & COMPANY LIMITED · LONDON · W.1 *Designers and Makers of Locomotive Lubricators since* 1889

To face last text]



Party Going?

Football Match? Theatre? Sightseeing?

IF YOU ARE organising a day out in London, why not arrange to hire a London Transport bus or coach? Start when you like, come home when you like. You can go to your football match or theatre, or to any other event within 100 miles of London, quickly, comfortably and all together, in a bus or coach seating from 35 to 56 people. The Private Hire fleet now includes specially-designed coaches, with roof windows through which you can even see Nelson on his column without craning.

For full details apply to the Private Hire Office, London Transport, 55 Broadway, Westminster, S.W.1 (Telephone ABBey 1234).

BY LONDON TRANSPORT

Issued by the London Transport Executive.

Bringing it home to us

POST a letter in London today, it will reach Glasgow by the morning—carried by rail and sorted on the way.

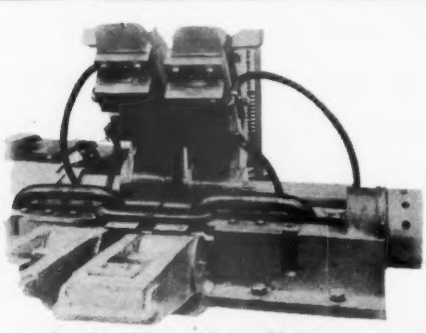
British Railways carry more than 7,500 million letters and 214 million postal parcels every year. And this is only a small part of their seven-day-a-week job keeping Britain's vital lifelines open. Your daily foodstuffs, your household needs, the raw materials and finished products of industry, the diverse needs of nearly a thousand million passengers a year . . . all are being handled despite a severe staff shortage.

British Railways need thousands more men and women for this important work. If you would like a worth-while job, apply to your local stationmaster, railway depot or nearest Employment Exchange, and

Join the Busiest Railway System in the World

BRITISH RAILWAYS

Produce
RAILWAY COUPLINGS & CHAIN
Simpler
Faster
Cheaper
by
A.I
AUTOMATIC
FLASH BUTT WELDING



Coupling Link—weld time 50 secs.

A.I. ELECTRIC WELDING MACHINES LTD.

68, VICTORIA STREET, LONDON, S.W.1

Tel.: VICtoria 4101. Grams: AIWELDS, SOWEST, LONDON

BIRMINGHAM · GLASGOW · INVERNESS

FROM THE "PIG"

TO THE PRODUCT

Lloyds High Duty Irons are under perpetual "quality control"

Although Lloyds castings are produced in large quantities, "quality control" is their constant taskmaster. Every batch of castings has a laboratory pedigree, all raw materials, and every heat, being under constant metallurgical control. Pig iron, scrap, alloys, coke and limestone are tested before reaching the cupola, whilst the charge is analysed every hour to ensure strict adherence to customer's specification. This complete scientific control gives castings a uniform structure, which ensures easy machining, exceptional durability and optimum efficiency. Write for a copy of "Iron Marches On".

LLOYDS HIGH DUTY IRONS

LLOYDS (BURTON) LTD., WELLINGTON WORKS, BURTON-ON-TRENT TELEPHONE: BURTON 3867

A Print for Industry Ltd., Advertisement

● WRITE TO-DAY FOR A COPY OF THE COOPER CATALOGUE

Black, machined or bright to any specification, Cooper nuts, bolts and studs are made true to requirements as regards materials and dimensions

REASONABLE DELIVERY

EXPORT ENQUIRIES INVITED

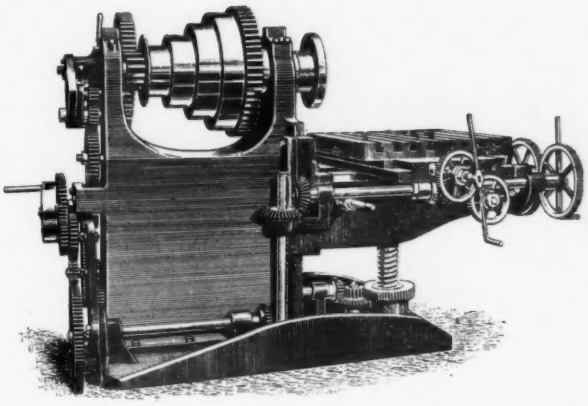
GEORGE COOPER & SONS

PROPRIETORS THOS. W. WARD LTD

EFFINGHAM NUT & BOLT WORKS

'PHONE: 41026 SHEFFIELD 'GRAMS "COOPER"

C/2



Circa 1900

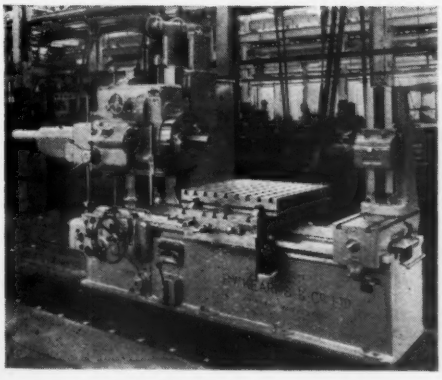
Sufficiently rigid workpiece support could not be achieved owing to the overhang and relatively short vertical guides of the table — on which, of course, fell the work of traversing, with consequent aggravation of the weakness.

(Illustrated by courtesy of Messrs. David Brown Machine Tools Ltd.)

KEARNS

biography of the borer

A HORIZONTAL BORING MACHINE which was being marketed some fifty years ago still showed its ancestry clearly. Established types of machine tools apparently dominated designer's thoughts, so the borer illustrated was a hybrid whose main elements comprised a lathe headstock and milling machine style tables. As was soon learned, deflection and low rigidity were its defects, together with the fact that no outer support could be provided for the boring bar



Kearns for Borers

In the No. 2 Kearns Patent Horizontal Surfacing and Boring Machine of to-day, note the all-round massiveness and the rigid column and head which permit fast working with the finest finishing.

H. W. KEARNS & CO. LIMITED, Broadheath near Manchester

Hopwood

W.R. SYKES INTERLOCKING SIGNAL CO. LTD

BLOCK SIGNALLING APPARATUS

of all kinds, including

Non-Token Single Line Block, Train Staff and Key Ticket System, Intermediate Sidings Key, Electrical Banner Signals (d.c. or a.c. working), Electrical Route Indicators, Time Element Relays (d.c.–self-contained–or a.c. working), Signal Proving Relays, Signal Repeaters and Indicators, Electrical Lever Locks and Circuit Controllers, Electrical Point Detectors, Immersed Type Repeaters for Frogmen's Posts, Track Drilling Machines, Insulated Rail Joints and Fittings, Level Crossing Alarms and Indicators, Train Describers with printed record and other Signalling Appliances.

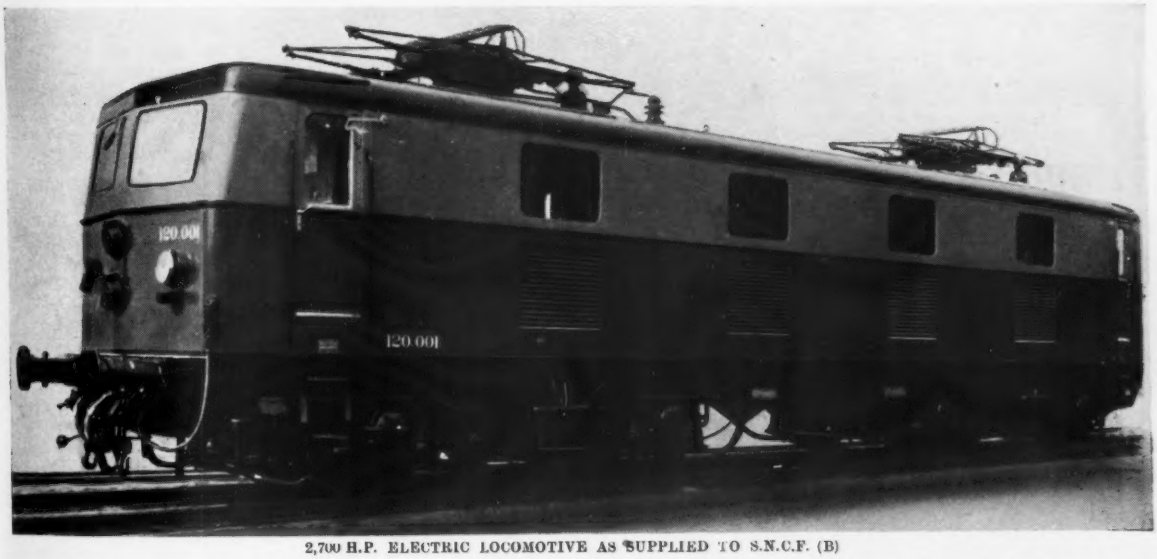
SHEET METAL TERMINAL & APPARATUS CASES

Made in any desired form or size to accommodate any class of equipment

26, VOLTAIRE ROAD, CLAPHAM, LONDON, S.W.4

Telephones: MACaulay 3451-3452-3453. Telegraphic Address: BLOCKISH, SOUPHONE, LONDON

RAISE PRODUCTIVITY
LOWER COSTS . . .
To-day's need is for ever-increasing productivity. Take the drag off production by handling your materials at all stages by modern mechanical means.
Bad handling of materials can account for 85% of the total costs. This unnecessary waste can be eliminated by efficient handling with Conveyancer Fork Trucks.
"Conveyancer"
FORK TRUCKS
PETROL · ELECTRIC · DIESEL
CONVEYANCER FORK TRUCKS LTD.
LIVERPOOL ROAD, SANKEY, WARRINGTON.
Tel. Warrington 2244 Grams "Hydraulics," Warrington.



2,700 H.P. ELECTRIC LOCOMOTIVE AS SUPPLIED TO S.N.C.F. (B)

ELECTRIC LOCOMOTIVES · DIESEL RAILCARS · DIESEL LOCOMOTIVES
PASSENGER COACHES · BRIDGES · WAGONS OF ALL DESCRIPTIONS · WHEELS AND AXLES
TYRES · STEEL CASTINGS AND FORGINGS · STRUCTURAL STEELWORK

S. A. BAUME & MARPENT, Haine St. Pierre, Belgium

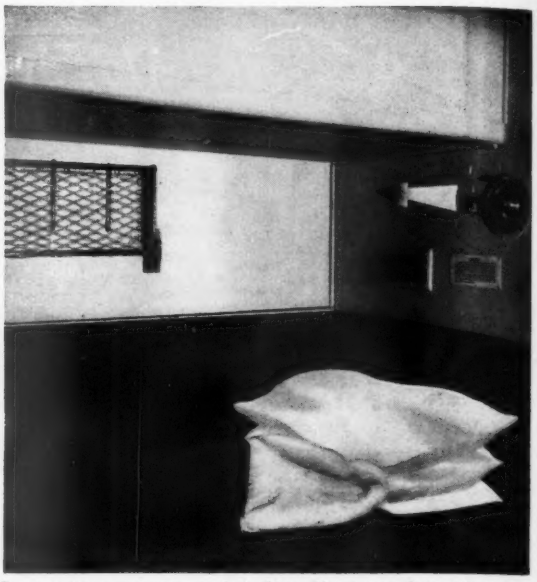
WORKS AT HAINE ST. PIERRE, MORLANWELZ AND MARPENT, N. FRANCE
United Kingdom Agents: BRANDHURST COMPANY LIMITED, Vintry House, Queen Street Place, London, E.C.4
Telephone: CENTRAL 1411

RAILWAY CARRIAGE HEATING VENTILATING & AIR CONDITIONING

THERMO-REG System of Heating and Ventilation as applied to Railway Coaches (louvre fitting illustrated) is an adaptation of Thermotank Equipment of high class Railway Cars.

Thermotank Systems are available for all types of railway car stock and provide mechanical ventilation with or without heating. Individual temperature control can be arranged to each separate berth, while in saloon and dining cars the control can be fitted to suit.

Ventilating air is effectively filtered and may be safely delivered to the compartment under any service conditions. Schemes involving cooling and air conditioning are available for railways in tropical regions and can be adapted to suit any climatic variations.



Berth in the new luxurious 3rd. Class Sleeper on British Railways London to Scotland Route showing the Thermotank 'Thermo-Reg' Directional and Regulating Louvre for the use of the occupant.

THERMOTANK LIMITED

Reg. Office: 150 Helen St., Glasgow, S.W.1

Manufacturing Consultants for all types of Air Conditioning Plant

Works at

GLASGOW. LONDON. LIVERPOOL. NEWCASTLE MONTREAL & JOHANNESBURG

THE RAILWAY GAZETTE.
A journal of Railway Management, Engineering, Operation, and Railway News. It covers every phase of railway activity. It is truly said of this journal that it is "Read Wherever there are Railways." *Yearly* £4 10s. *post free.* *Weekly* 2s.

DIESEL RAILWAY TRACTION.
A monthly review of world-wide developments in diesel-engine design, practice and maintenance and diesel railway traction operation. *Yearly* 30s. *post free.* *Monthly* 2s. 6d.

SHIPBUILDING & SHIPPING RECORD.
The only publication with direct appeal to both shipowner and shipbuilder. Its world-wide news organisation and technical articles and drawings put it in the forefront of shipping periodicals. *Yearly* £4 10s. *post free.* *Weekly* 2s.

POWER AND WORKS ENGINEERING.
Specifically concerned with the effectiveness and economy of factory services, including steam raising, power generation and application, and all engineering plant problems. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

COLLIERY ENGINEERING.
A practical journal dealing with all aspects of coal production; every branch of coal mining technology is reviewed in detail and special attention is given to mechanisation and labour-saving machinery. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

COKE AND GAS.
A technical journal dealing with the scientific and technical problems involved in the production of coke and gas in coke ovens and gasworks and the industrial uses of these fuels. *Yearly* 30s. *post free.* *Monthly* 2s. 6d.

THE RAILWAY MAGAZINE.
A popular magazine containing illustrated articles on Railways and locomotives. Published Monthly. *Yearly* 26s. *Monthly* 2s.

NEW COMMONWEALTH.
Describes and illustrates significant developments in production, trade, transportation and relates spheres in all countries of the Commonwealth, and provides a unique service of economic information from 50 countries with a total population of 560 millions. *Yearly* 50s. *post free.* *Fortnightly* 2s.

THE INDUSTRIAL CHEMIST.
A technical journal devoted to the progress of applied chemistry and chemical engineering. It is of vital importance to the chemical manufacturer and all who employ chemical processes in their productive operations. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

BUILDING.
A journal for practising and salaried architects, building contractors, designers and specialists. It deals with the planning, design, construction and the administration of modern building work. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

WOOD.
"Wood" is the only magazine of its kind. Primarily concerned with the use of wood, it includes articles on trees and timbers, design and construction in all decorative and practical wood usage, machines and machine practice, and trends in world supply. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

FOOD.
A journal devoted to the manufacture, packing and marketing of processed foodstuffs, and of the utmost value to firms supplying plant, equipment or materials for the food industry. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

WATER POWER.
A technical journal devoted to the study of all aspects of Hydro-Electric development. *Yearly* 35s. *post free.* *Monthly* 2s. 6d.

TOTHILL PRESS LIMITED 33, Tothill Street, Westminster, London, S.W.1.

MACHINES that have built the BOOTH name.. ...No 4

The illustration shows a steam-operated slab charger, the forerunner of the modern slab charger. We actually built an electric charger about 1900 and this machine remained in service up to a few years ago.

JOSEPH BOOTH & BROS.

'PHONE DUDLEY 3168 Proprietors CLYDE CRANE & BOOTH LTD GRAMS "CRANES, RODLEY"

RODLEY · LEEDS

London Office: 112-13 Fenchurch Street, London E.C.3 Telephone: London Royal 3633

If you have an interesting machine which has helped to "build the Booth name" we shall be pleased to have particulars for inclusion in this series.

BP.4

M&W·GRAZEBROOK LTD.

MANUFACTURERS OF CLASS I. PRESSURE VESSELS AND RAILWAY TANKERS

- WELDED CHEMICAL AND OIL REFINERY PLANT, HOMOGENEOUSLY LEAD LINED.
- FABRICATIONS FOR HEAVY ENGINEERING.
- WELDING BY UNION-MELT PROCESS, X-RAY TESTED.
- IRON CASTINGS UP TO 18 TONS.
- HOT PRESSINGS, UP TO 1½in. THICK, 11ft. WIDE BY 15ft. LONG.

Special Hopper Wagon.

ESTABLISHED A.D. 1750

M. & W. GRAZEBROOK LIMITED,
DUDLEY · WORCESTERSHIRE

Telephone: DUDLEY 2431-3.
Telegrams: Grazebrook, Dudley.

HOMOGENEOUS LEAD LININGS · HEAVY ENGINEERS AND IRON FOUNDERS

"Perfectly clear!"
Railway Telephones must be dependable — that is why Ericsson Railway Telephone equipment is so largely used on BRITISH RAILWAYS and in the Dominions.
For over 50 years Ericssons have been making telephone apparatus which must stand up to the toughest treatment. Enquiries welcomed.
Ericsson
RAILWAY TELEPHONES

Ericsson Telephones Ltd., 22, Lincolns Inn Fields, London, W.C.2. Tel.: HOLborn 6936. Works: Beeston, Notts

TO ALL OPERATORS OF DIESELS

Have you seen this machine?

IN 5 MINUTES it will completely re-condition fuel injector nozzles and needles to manufacturers' original standards!

The "Merlin Service Master" will grind a point dead concentric with another portion and maintain a pre-determined angle to within a minute of a degree. Readily adaptable for all forms of grinding within its capacity, including valves and tappets.

Write for details of how to SAVE on operating costs, from the sole manufacturers and patentees of the

A PRODUCT

MERLIN SERVICE MASTER

NOW USED BY all the leading Diesel Engine Manufacturers, Railways, Municipal Transport, Shipping Lines and Government Departments

Dept. RG, MERLIN ENGINEERING CO., LTD.,
Hebble Mills, Salterhebble, Halifax, Yorkshire.

AVO *Precision* ELECTRICAL TESTING INSTRUMENTS

The **Model 7** Universal

AvoMeter

The world's most widely used combination electrical measuring instrument. Provides 50 ranges of readings on a 5-inch hand-calibrated scale fitted with an anti-parallax mirror. Guaranteed accurate to B.S. first grade limits on D.C. and A.C. from 25 c/s to 2 Kc/s.

The meter will differentiate between A.C. and D.C. supply, the switching being electrically interlocked. The total resistance of the meter is 500,000 ohms.

CURRENT: A.C. and D.C. 0 to 10 amps
VOLTAGE: A.C. and D.C. 0 to 1,000 volts
RESISTANCE: Up to 40 megohms
CAPACITY: ·01 to 20μF.
AUDIO-FREQUENCY POWER OUTPUT: 0 — 2 watts
DECIBELS: —25Db. to +16Db

The instrument is self-contained, compact and portable, simple to operate and almost impossible to damage electrically. It is protected by an automatic cut-out against damage through severe overload.

Various accessories are available for extending the wide ranges of measurements quoted above.

£19 : 10s.

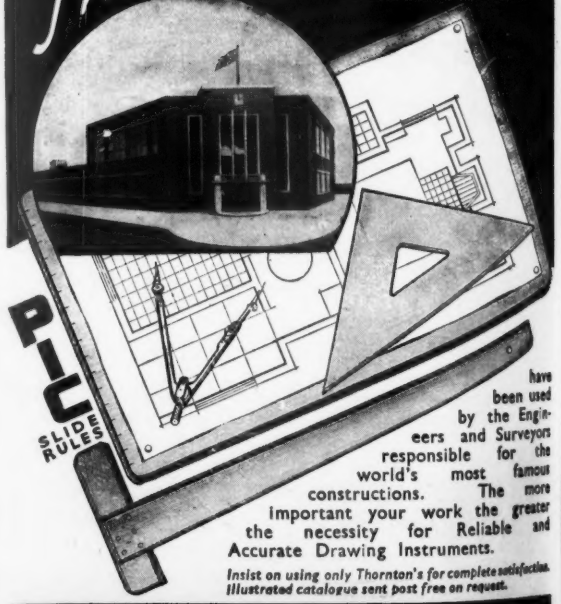
Size: 8" × 7½" × 4½"
Weight: 6¼ lbs. (including leads).

● *Write for fully descriptive pamphlet*

Sole Proprietors and Manufacturers:
AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
WINDER HOUSE, DOUGLAS ST., LONDON, S.W.1. *Telephone: VICtoria 3404-9*

47/6

Thornton's DRAWING INSTRUMENTS

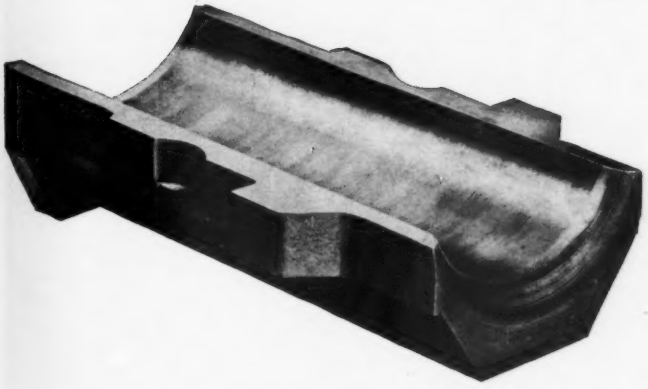


have been used by the Engineers and Surveyors responsible for the world's most famous constructions. The more important your work the greater the necessity for Reliable and Accurate Drawing Instruments.

Insist on using only Thornton's for complete satisfaction. Illustrated catalogue sent post free on request.

A. G. THORNTON LTD
Drawing Instrument Specialists
WYTHENSHAWE, MANCHESTER
Tel: WYThenshawe 2277 (4 lines)

Representing



PRODUCED BY
RAILWAY BEARING SPECIALISTS

50 YEARS of RAILWAY BEARING SERVICE

THE **EYRE** SMELTING COMPANY LTD.,
Tandem Works, Merton Abbey, London, S.W.19. Telephone: MITcham 2031 (4 lines).

7641

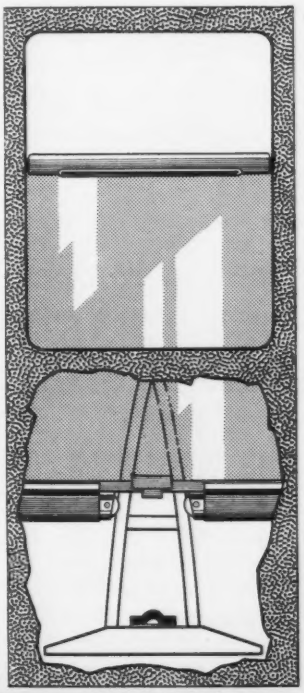
THE **NEW**

Widney "SOLEX"

CONSTANT BALANCED WINDOW

Covered by British and Overseas Patents.

The "SOLEX" has been specially designed to meet the demand for an efficient Full Drop coach door window, with a smooth and silent mechanism fully protected against dust and corrosion. In the closed position it cannot be opened from outside the coach. Glass replacement can be made without removing panels below the waistrail.



SP.78

A Widney PRODUCT

USED ALL OVER THE WORLD

ESTABLISHED 1898

HALLAM, SLEIGH & CHESTON LTD
WIDNEY WORKS · BIRMINGHAM · 4

Phone: Aston Cross 0914 (4 LINES) • Grams: Superfine, Birmingham.4.

Leaflet No. L506 gives full details

DATA SHEETS

for Engineering Students and Apprentices

You will many times have wished to have by you a set of drawings showing methods of using, and applications of certain tools, and now in convenient form you can obtain such a set detailing the more important Moore & Wright Precision Hand Tools together with Charts for Decimal Equivalents, Drill Sizes and Tapping and Clearance Drills. There are 16 numbered Sheets to the Set in blueprint form, 8″ × 10″ notebook size, and punched to fit a special binder which is also supplied, and into which loose-leaf notepaper can be fastened to make the binder into a very comprehensive notebook.
Other drawings will be made available later, and there is no doubt that if the folder is kept up-to-date, together with your own notes it will become a really valuable Compendium of Engineers' Precision Tools.

RETAIL PRICES

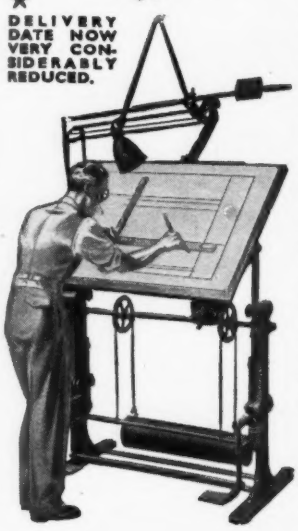
Complete with Binder - - - 4s. 6d. per set
Separate Sheets 3d. each. Binders only 1s. 6d. each

Please apply to your usual Tool Dealer.

MOORE & WRIGHT (SHEFFIELD) LTD.
14-28, NORTON LANE, MEADOW HEAD, SHEFFIELD, 8

The perfect drawing board

★ DELIVERY DATE NOW VERY CONSIDERABLY REDUCED.



The MAVITTA Drafting Machine stamps your drawing office as EFFICIENT. Made of steel tube with adjustable ball-bearings. The main angles are located automatically, intermediate angles by lock. Scales have inlaid celluloid edges and are divided to order on two edges.

THE MAVITTA DRAFTING MACHINES LTD.
Highlands Road, Shirley, Near BIRMINGHAM
Telephone: Solihull 2231/2
GRAMS.: Mavitta, B'ham

MAVITTA
DRAFTING MACHINES

Write for details of the New Major Machine for use on boards size 84″ x 44″ and upwards

P.L.A. Railways

by Thomas B. Peacock

All about the Port Authority's own railway system in London and Essex

Fully illustrated *Price 15s.*

THE LOCOMOTIVE PUBLISHING COMPANY LIMITED
88 HORSEFERRY ROAD, LONDON, S.W.1

JOSEPH KAYE & SONS LTD

(Established 1864)

Makers of Kaye's patent automatic railway carriage door wedge locks—and all other types of door and cabinet locks—as adopted by most of the British and Colonial Railways.

LOCK WORKS, LEEDS, 10
AND AT 1 DANE STREET, LONDON, W.C.1

SWITZERLAND
IS CHEAPER!

FOR PERFECT HOLIDAYS - SUNSHINE AND GLORIOUS SCENERY - EXCELLENT HOTELS & FOOD - PRICES NOW VERY MODERATE - AMPLE CURRENCY

10 DAYS - 21 GNS.
14 DAYS from 24 GNS.

Delightful lakeside and mountain resorts. All inclusive with escorted travel from London

Post coupon for free illustrated literature

B.T. SWISS TRAVEL AGENCY, 59, CRAWFORD STREET, LONDON, W.1

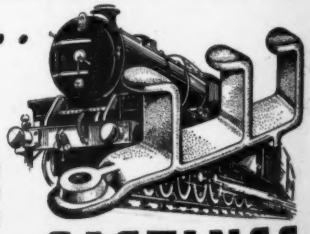
M.....

.....

(BLOCK CAPS) R.G.

The PERMANENT WAY...

for durability specify...



HALE
MALLEABLE IRON CASTINGS

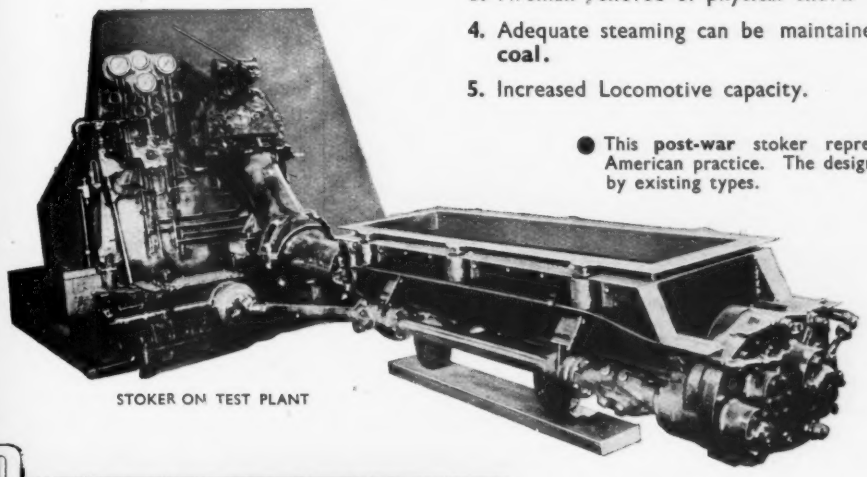
HALE & HALE (TIPTON) LIMITED DUDLEY PORT Staffs

Recognised the world over

for

SCIENTIFIC FIRING

1. Special features ensure uniform distribution of coal.
2. Variable and accurate control of the coal fired ensures a high degree of combustion and prevents waste of steam.
3. Fireman relieved of physical effort.
4. Adequate steaming can be maintained with **poor quality coal.**
5. Increased Locomotive capacity.

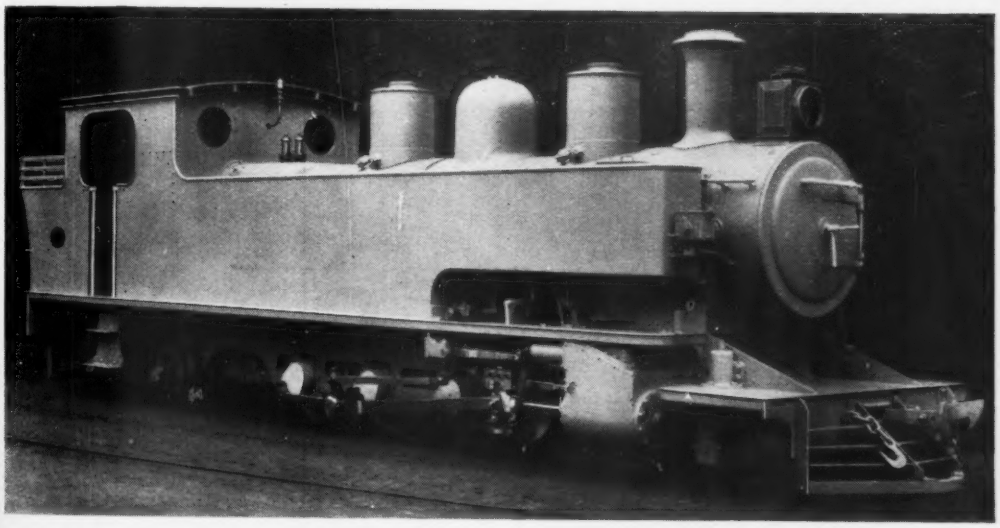


STOKER ON TEST PLANT

- This **post-war** stoker represents the most modern American practice. The design has not been restricted by existing types.
- Robust construction.
- Simple in design.
- Lubrication system perfected to suit **all** operating conditions.
- Low cost of maintenance.

BERKLEY *Locomotive* **STOKER**

BERKLEY STOKER COMPANY, LIMITED
GRAND BUILDINGS, TRAFALGAR SQUARE, LONDON, W.C.2



A powerful 2-8-4T engine for the 2ft. 6in. gauge Dolphur State Railway. Tractive effort 10,300 lb. on 5·65-ton axle load

HUNSLET

HUNSLET ENGINE CO. LTD., LEEDS 10

STEAM ENGINES UP TO 130 TONS
DIESEL LOCOMOTIVES UP TO 750 H.P.

ADVERTISEMENTS IN THIS ISSUE.

A1 Electric Welding Machine Co., Ltd. .. 38
A.B.C. Coupler & Engineering Co., Ltd. .. 22
A.C.V. Sales, Ltd. .. 9
Associated British Machine Tool Makers, Ltd. .. 32
Automatic Coil Winder and Electrical Equipment Co., Ltd. 46
B.T. Swiss Travel Agency .. 48
Baker, John, & Bessemer, Ltd. .. 27
Baume & Marpent, S.A. .. 43
Beckett, Laycock & Watkinson, Ltd. .. 33
Belships Co., Ltd. .. 25
Berkley Stoker Co., Ltd. .. 49
Beyer Peacock & Co., Ltd. .. 1
Bolton, Thos., & Sons, Ltd. .. 50
Booth, Joseph, & Bros. .. 45
Brandhurst Co., Ltd. .. 43
British Railways .. 37
British Timken, Ltd. .. 51
Chloride Batteries, Ltd. .. 18*b*
Clyde Crane & Booth, Ltd. .. 45
Conveyancer Fork Trucks, Ltd. .. 43
Cooper, Geo., & Co., Ltd. .. 40
Coventry Machine Tool Works, Ltd. .. 6
Cravens Railway Carriage & Wagon Co., Ltd. .. 13
Crompton Parkinson, Ltd. .. 30
Davies & Metcalfe, Ltd. .. 12
Elastic Rail Spike Co., Ltd. .. 34
English Electric Co., Ltd. .. 15
Ericsson Telephones, Ltd. .. 46
Eyre Smelting Co., Ltd. .. 47
Firth Brown Tools, Ltd. .. 26
Grazebrook, M. & W., Ltd. .. 45
Gresham & Craven, Ltd. .. 8
Hale & Hale (Tipton), Ltd. .. 48
Hallam Sleigh & Cheston, Ltd. .. 47
Harvey, G. A., & Co. (London), Ltd. .. 23
Hasler Telegraph Works .. 21
Hunslet Engine Co., Ltd. .. 49
Imperial Chemical Industries, Ltd. 18
K. & L. Steelfounders & Engineers, Ltd. .. 24
Kaye, Joseph, & Sons, Ltd. .. 48
Kearns, H. W., & Co., Ltd. .. 41
Laycock Engineering Co., Ltd. .. 19
Lloyds (Burton), Ltd. .. 39
Locomotive Publishing Co., Ltd. 48
London Transport Executive .. 36
Mavitta Drafting Machines, Ltd. 48
Merlin Engineering Co., Ltd. .. 46
Metropolitan-Cammell Carriage & Wagon Co., Ltd. .. 10 & 11
Metropolitan - Vickers Electrical Co., Ltd. .. 18*a* & 52
Mills, The Exors. of James, Ltd. 14
Moore & Wright (Sheffield), Ltd. 48
Northern Aluminium Co., Ltd. .. 7
Owen & Dyson, Ltd. .. 4
Provident Mutual Life Assurance Association .. 50
Richards, Charles, & Sons, Ltd. .. 42
Scottish Machine Tool Corporation, Ltd. .. 31
Sheffield Twist Drill & Steel Co., Ltd. .. 16
Steel Company of Wales, Ltd. .. 17
Sulzer Bros. (London), Ltd. .. 2
Sykes, W. R., Interlocking Signal Co., Ltd. .. 42
Taylor, Bros., & Co., Ltd. .. 20
Thermotank, Ltd. .. 44
Thornton, A. G. .. 46
Vulcan Foundry, The, Ltd. .. 29
Wakefield, C. C., & Co., Ltd. .. 35
Ward, H. W., & Co., Ltd. .. 32
Ward, Thos. W., Ltd. .. 40
Westinghouse Brake & Signal Co., Ltd. .. 5
Wickman, Ltd. .. 3
Wickham, D., & Co., Ltd. .. 28

PROVIDENT MUTUAL
LIFE ASSURANCE ASSOCIATION

(FOUNDED 1840)

FUNDS . . £16,000,000

The PROVIDENT MUTUAL is a mutual and co-operative Association, the business being conducted solely for the benefit of the Policy Holders.

Life and Endowment Assurances to suit every requirement, including HOUSE PURCHASE. Premiums deducted through the paysheets.

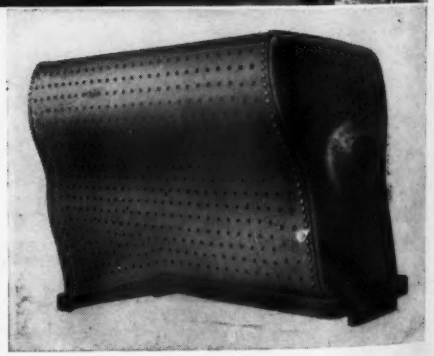
Apply for particulars to:

J. M. ROBERTSON, GENERAL MANAGER, 25-31, Moorgate, London, E.C.2.

THOMAS BOLTON & SONS LTD

Trade Mark

BOLTON'S COPPER PRODUCTS IN LOCOMOTIVE ENGINEERING



Copper Fire-Box Plates, Stay Rods and Copper Tubes.

Bolton's Copper Products comply with all relevant British Standard Specifications and with many other Home, Colonial and Foreign Government requirements.

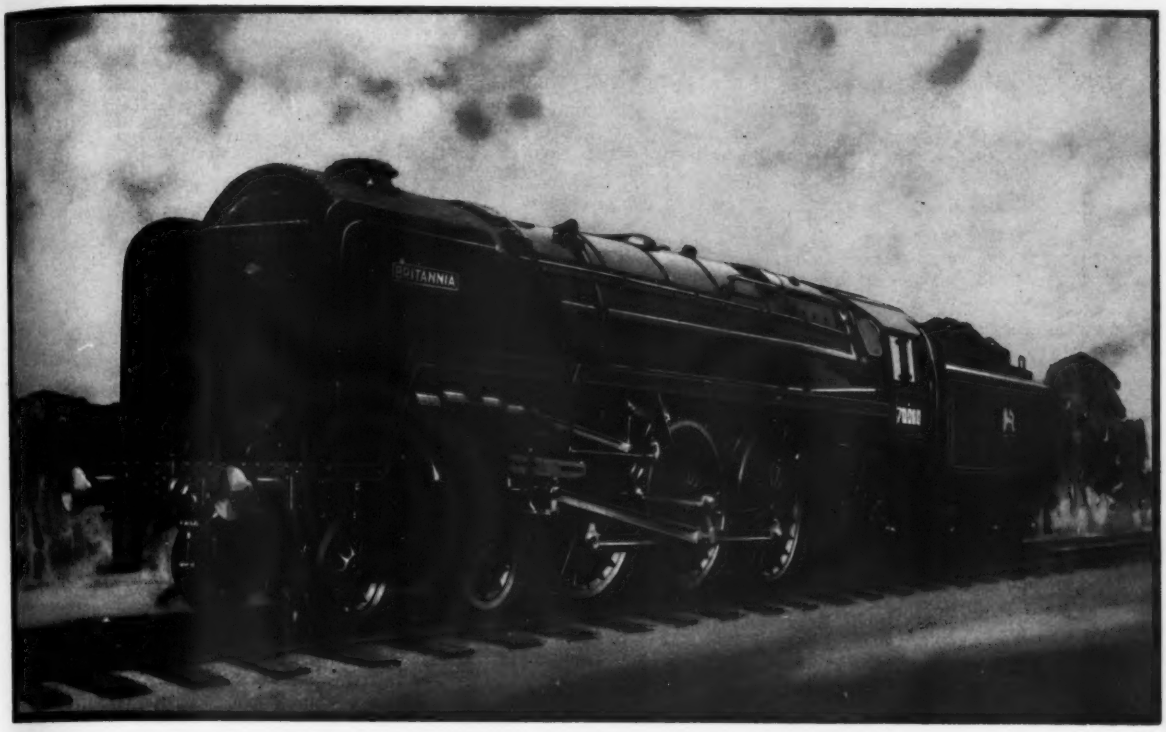
THOMAS BOLTON & SONS LIMITED

HEAD OFFICE: WIDNES, LANCASHIRE. Telephone: WIDNES 2022
London: 168 Regent Street, W.1. Telephone: Regent 6427/8/9.

Established 1783

CVS—105

LONDON: Printed by HARRISON & SONS, LTD., Printers to His Majesty the King, London, Hayes (Middx.) and High Wycombe, and Published by TOTHILL PRESS LIMITED, Proprietors of THE RAILWAY GAZETTE, at 33, Tothill St., Westminster, London, S.W.1. February 1, 1952



B.R. CLASS 7
STANDARD LOCOMOTIVES

The first of the British Railways Class 7 standard locomotives, equipped with Timken cannon-boxes on bogie and driving axles and Timken outside-journal axleboxes on the trailing truck and tender axles.

Illustrated by courtesy of British Railways

TIMKEN Regd. Trade Mark: TIMKEN

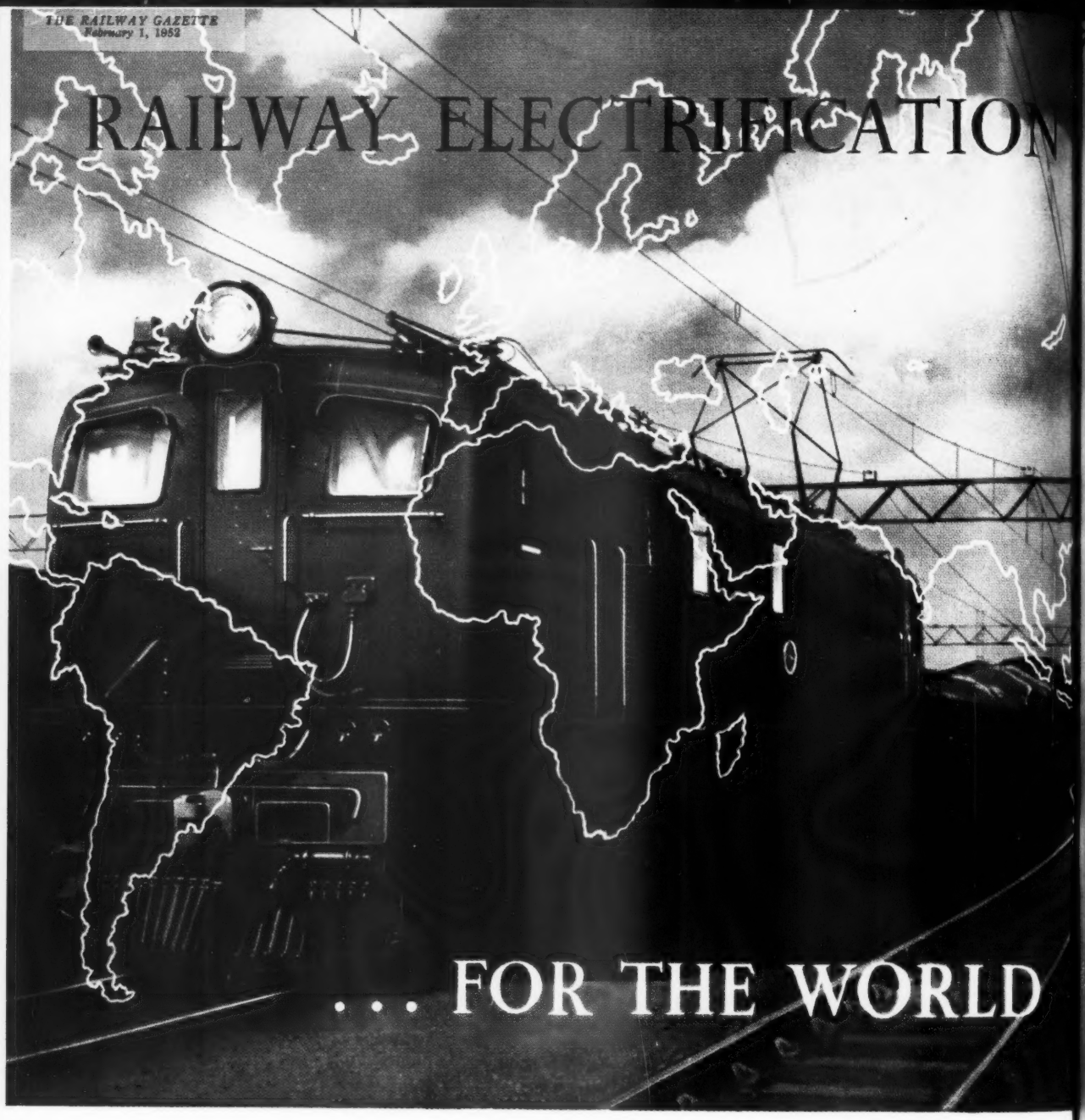
tapered-roller-bearing axleboxes

MADE IN ENGLAND

BRITISH TIMKEN LIMITED, BIRMINGHAM, AND DUSTON NORTHAMPTON

Telephone: East 1321 Telegrams: Britimken, Birmingham

Subsidiary Company: Fischer Bearings Co. Ltd., Wolverhampton, makers of FBC ball and roller bearings and transmission equipment



The experience of Metropolitan-Vickers ranges over the entire field of electric traction. Main line locomotives, multiple unit trains, diesel-electric locomotives, industrial locomotives, and all the auxiliary equipment which go to build them can be supplied by Metrovick. The advice of Metrovick engineers is available on all traction needs from gears to complete electrification schemes.

Illustration shows one of twenty-eight Metrovick 3,000-volt, 2,700 h.p. 6-axle mixed traffic locomotives built for South African Railways.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17.
Member of the A.E.I. group of companies

METROVICK *Traction for More Efficient Transport*

K/T103